Biodiversity in protected landscapes • Healthy parks, healthy people Biological objectives in refuge planning • Prairie dog management Visitor support for park fees • Saving sea turtles The National Parks Second Century Commission

**Civil Society &** 

**Protected Areas** Lessons from Canada

# The George Wright Forum

The GWS Journal of Parks, Protected Areas & Cultural Sites

volume 26 number 2 • 2009





#### Origins

Founded in 1980, the George Wright Society is organized for the purposes of promoting the application of knowledge, fostering communication, improving resource management, and providing information to improve public understanding and appreciation of the basic purposes of natural and cultural parks and equivalent reserves. The Society is dedicated to the protection, preservation, and management of cultural and natural parks and reserves through research and education.

### Mission

The George Wright Society advances the scientific and heritage values of parks and protected areas. The Society promotes professional research and resource stewardship across natural and cultural disciplines, provides avenues of communication, and encourages public policies that embrace these values.

### Our Goal

The Society strives to be the premier organization connecting people, places, knowledge, and ideas to foster excellence in natural and cultural resource management, research, protection, and interpretation in parks and equivalent reserves.

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# The George Wright Forum

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### On the cover

The Cirque of the Unclimbables, part of a massive expansion of Canada's Nahanni National Park Preserve. Civil society—the actions of engaged citizens, whether individually or as part of nongovernmental organizations—has played the central role not only in securing this expansion, but in creating all of Canada's systems of protected natural areas. See article by Harvey Locke beginning on p. 101. Photo courtesy of Harvey Locke.

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the George Wright Society has been about one thing:

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## SOCIETY NEWS, NOTES & MAIL

### Wright to be featured in Burns/Duncan film

George Melendez Wright will be prominently featured in a segment of the forthcoming documentary series "The National Parks: America's Best Idea" by the film-makers Ken Burns and Dayton Duncan. The series will air on the US Public Broadcasting System (PBS) network starting on September 27. As noted by Duncan in his NPS Centennial Essay, which ran in the last issue of *The George Wright Forum*, Wright is one of a number of people from diverse backgrounds who are featured in the movie because they contributed fundamentally to the development of America's national park system. In the episode, narrative and interviews are mixed with quotes from Wright, who is voiced by the actor Andy Garcia. For more information on the film, go to www.pbs.org/nationalparks.

### First Bob Linn Scholarships awarded

The Isle Royale and Keweenaw Parks Association (IRKPA), the cooperating association for Isle Royale National Park and Keweenaw National Historical Park, has established a new scholarship in honor of Bob Linn. GWS members will be familiar with Linn as a cofounder and long-time executive director of our Society, but he also helped found the Isle Royale Natural History Association (predecessor to IRKPA) and was a driving force in that organization for many years. The scholarship honors Linn by providing \$250 in financial assistance to a graduating senior from a high school in the Keweenaw Peninsula area, or a child of an IRKPA member, who plans to pursue a college major in biology, conservation, forestry, or earth sciences.

Because there were two exceptionally well-qualified applicants during the first round, the Society stepped in and contributed \$250 to the fund so that both could be given scholarships. The winners were Gabrielle Jukkala, who will major in biology at Northland College, and Haley Juntunen, who will do the same at the University of Minnesota. GWS members are welcome to contribute to the Bob Linn Scholarship Fund. Make checks payable to "IRKPA," noting "Bob Linn Scholarship" on the memo line, and send to Isle Royale and Keweenaw Parks Association, 800 E. Lakeshore Dr., Houghton, MI 49931 USA.

### Wright field notes now available on-line

George Wright was very much a working field naturalist during most of his brief career. Wright's field notes are important primary sources because he meticulously documented wildlife sightings and ecological conditions. In addition, they provide insight into Wright's thinking and writing style. His notes from 1926 (Mount McKinley District, Alaska) and 1930–31 (various locations in the West) are housed in the Museum of Vertebrate Zoology at the University of California–Berkeley, having been donated by the family of Pamela Wright Lloyd. Now, scanned copies of most of these notes are available for viewing on-line. All of the 1926 notes are viewable, as are most of the 1930–31 notes, with the remainder to be made available in the future. To find them, go to http://bscit.berkeley.edu/mvz/volumes.html and select Wright's name from the drop-down menu.

### Former GWS president nominated to lead NPS

Jonathan Jarvis, who completed two terms on the GWS Board of Directors in the 1990s and served as the Society's president in 1997 and 1998, has been nominated to be the next director of the US National Park Service. If confirmed, he will become the 18th director of the agency and the first to be trained as a scientist and resource manager. Jarvis's NPS career spans more than 30 years and includes superintendencies at Craters of the Moon, Wrangell– St. Elias, and Mount Rainier. A GWS Life Member, Jarvis currently serves as regional director for the NPS Pacific West Region. As of this writing, Senate confirmation hearings for Jarvis's nomination had not been scheduled.

## 1916 ESSAY SERIES 2016

### Diary for a Second Century: A Journey across America's National Park System in Search of its Future

Rolf Diamant

### Solstice Canyon, 2008

IT IS LATE AUGUST IN SOLSTICE CANYON in Santa Monica Mountains National Recreation Area in southern California. The streamside oaks provide some welcome shade. This is the first meeting of the National Parks Second Century Commission, and the commissioners are spending this warm afternoon seeing some things they never expected to encounter in a national park. Following a brief amphitheater orientation by Henry Ortiz, science coordinator for the Los Angeles Unified School District, we make our way to the water's edge where three dozen or so young "Eco-helpers," recruited from inner-city East Los Angeles, are carefully planting trees and shrubs. Most of these diverse kids are from single-parent homes, and today is family day for the Eco-helpers. Alongside their parent and a sibling or two, shovels in hand, they are hard at work. National Park Service (NPS) biologists share encouragement, advice, and a strong shoulder when needed. This is clearly not the stereotypical family visit to a national park. The pride and stewardship associated with this program suggest not only positive outcomes for all participants but also a deeper level of public engagement with the park itself.

The mandate of the National Parks Second Century Commission, which is funded through a grant to the National Parks Conservation Association, is to produce a report with a vision for the future of the national park system and NPS, and shape an action agenda for the Administration and Congress. The five commission meetings are scheduled for Santa Monica, Lowell, Yellowstone, Gettysburg, and Great Smoky Mountains, and will highlight the challenges and opportunities specific to these parks and common to parks across the system. These visits are to encourage serious reflection about innovation and recent lessons learned, and provide a setting for community partners to discuss the values and meaning of

parks today. The report is expected to be completed by fall of 2009 and coincide with the broadcast of the Ken Burns PBS documentary "The National Parks: America's Best Idea."

The commission is co-chaired by former US Senators Bennett Johnston and Howard Baker, and staffed by retired NPS Chief of Policy Loran Fraser. Jon Jarvis, Pacific West regional director [now nominated to be the next NPS director], is the point of contact for the National Park Service. I've been asked to work with Jon capturing lessons learned from the commission's park visits and the many conversations with national park and program staff, topical experts, and park constituencies. At Santa Monica I am also teamed up with retired NPS Chief Historian Dwight Pitcaithley to make a presentation entitled "History of the National Park Idea: Points of Change." The idea behind our presentation is that there have been times when NPS has embraced innovation and progress despite periods of retreat and retrenchment. And that it is useful to examine lessons learned from these experiences as the commission begins to think about what might be required to re-position NPS to be successful over its next 100 years.

Somewhere along our route through Santa Monica we stop on a ridge top, part of a slender corridor of open land recently traversed by a radio-collared cougar. The cougar has threaded its way past some nearby subdivisions to reach another one of the rugged ridges that envelop this vast landscape. Denis Galvin, a commissioner and former deputy NPS director, reminds me that it was in 1979 that he and I drove these mountain roads together when I was assigned, as a very young landscape architect, to organize a planning team for the newly minted Santa Monica Mountains National Recreation Area. The ink on the enabling legislation was barely dry, and it took an entire day's drive for us to traverse this archipelago of future parkland, all the while thinking that Santa Monica was clearly going to present NPS with one of its most complex and difficult challenges to date.

But now it is thirty years later, and Deny and I are listening to Superintendent Woody Smeck talk about managing beyond park boundaries and the "urban/wildland interface environment." Woody is explaining to us how one the most densely populated places in the United States can support a viable population of mountain lions. He also describes the critical role played by his partnerships—a seamless network of private, local, state, and national parks programmatically and physically linked to communities throughout metropolitan Los Angeles. Many members of these communities, particularly those who have been traditionally underserved by park agencies, are not only using these parks but are gradually becoming their most committed stewards and advocates.

When people ask why the Second Century Commission chose Santa Monica as the venue for its first meeting, the answer now seems obvious. If a national park can make such a transformative and meaningful contribution in this most challenging of environments—with an elaborate mosaic of land uses and agency jurisdictions, urban and suburban pressures, and the needs of so many diverse communities—perhaps there is reason to believe that national parks will not only survive but thrive in the dynamic terrain of their second century.

### Wannalancit Mill, 2008

A brisk October breeze blows through the open sides of the trolley as we complete our urban

journey across the city of Lowell to the oversized wooden doors of Wannalancit Mill. The red brick mill—now part University of Massachusetts conference center, part NPS museum—functions like much of Lowell National Historical Park: as a great civic collaboration. The Second Century Commission has come to Lowell National Historical Park and nearby Essex National Heritage Area for its second meeting—with a clear intent to look more closely at the broad universe of partnerships. We gather in the Wannalancit Mill to hear Lowell Superintendent Michael Creasey, and partners from University of Massachusetts– Lowell and Middlesex Community College, discuss their deep long-term relationship, a relationship that is not only changing the city but also the way national parks are perceived. The establishment of the park in the 1970s, they explain, was a crucial step not only in the environmental, social, and economic renaissance of Lowell, but also in the transformation of Lowell into what they call an "educative city" with an ambitious agenda of curriculum-based civic learning and community service projects.

Each partner in this collaboration brings something different to the table, and these relationships are based on years of mutual effort and personal trust. Creasey describes the park as a "hub" in a much larger network of community and regional partners. He defines his success by how effective the NPS is in enabling the success of key partners. But we are also reminded that partnerships, even those that appear most successful, are only as strong and durable as the capacity of the partners to work through inevitable leadership and organizational transitions. The issue of leadership capacity is very much on the commission's mind in relation to the future of the National Park Service.

Back in the early 1990s, I spent a year at Lowell National Historical Park as acting superintendent, and I still have friends among the staff there. But I quickly sense that the park is in some ways fundamentally different now, and the shift becomes clearer that evening when the commission is entertained by the Angkor Dance Troupe. Lowell has the secondlargest Southeast Asian population in America and the Angkor Dance Troupe, an intergenerational group based at the park's Patrick Mogan Cultural Center, is performing in traditional Cambodian dress. The troupe's director is Duey Kol, a capable and effervescent young woman who also happens to be, in her "day job," a national park ranger. The NPS in Lowell has taken its relationship with the Cambodian-American community, as well as other underserved populations, to a deeper level. The agency is accomplishing this by engaging young people, first with programs and then with jobs. Former NPS Director Roger Kennedy once said, "Resource protection only has staying power if it is also education.... Resource protection has to walk out of the park in the heart of the visitor." The values of the park are enhanced when they are also perceived as a part of a larger set of cultural and community values that people care about. Park constituencies are created and strengthened not only from visits and recreational experiences, but also through service, cooperation, and community reciprocity.

### Mammoth Hot Springs Hotel, 2009

It is January and deep winter in Yellowstone National Park. The function room in the Mammoth Hot Springs Hotel is packed for the third meeting of the Second Century Commission.

It is warm inside but outside the temperature is ten below and it is snowing. For those of us who work in smaller national parks, Yellowstone seems like a country unto itself. Stealing a glance out the hotel's window is a quick reminder of the scale of this landscape. Our venue is particularly fitting because this commission meeting is largely focused on the issue of landscape-scale conservation.

The relative isolation of many national parks in the 19th and 20th centuries, a characteristic of their original rural setting, is over. An invited panel of scientists, academics, and resource managers reminds the commission that even the largest national parks, such as Yellowstone, cannot adequately protect and manage wildlife that cross boundaries with regularity. National parks, large and small, have responsibility for only a part of much larger ecosystems, landscapes, and seascapes.

The panel describes how landscape fragmentation and habitat encroachment are accelerating throughout the West, but in the Greater Yellowstone Ecosystem the statistics are particularly alarming. From 1990 to 2007, there was a 62% population increase and a corresponding 350% increase in developed land. Many large tracts of private open land, farmed and ranched for generations, are being broken up into rural subdivisions and "ranchettes." The impact of these trends on biodiversity is all too clear: in recent years, parks in the region have lost up to 40% of their wildlife.

While consensus is relatively easy to reach on defining the challenges, agreeing on the right approach to landscape-scale conservation is more elusive. The panel stresses the importance of using sound science and research in planning and policy development. Several panelists urge the commission to recommend stronger federal interagency coordination and more management consistency—particularly in a region such as the Greater Yellow-stone Ecosystem where national parks are part of a mosaic of federal lands. Others make the case that given the vastness of these larger landscapes surrounding parks and preserves, conservation has to become a shared objective for stakeholders throughout the region. They encourage the commission to strengthen the capacity of NPS and partners to work cooperatively with local land trusts, private landowners, and local governments. A former executive of The Nature Conservancy, Stephanie Meeks, summed it up this way: "We have learned that we cannot do conservation around these communities or for them; conservation will be successful only when considered and undertaken with them."

Not all of the commission's time at Yellowstone is spent indoors. We have a guided field trip out to Norris Geyser Basin and the Grand Canyon of the Yellowstone in a couple of snow coaches that the park owns and operates. When we enter the Norris overlook, one of our coaches throws a track. We file out of the disabled vehicle and a park interpreter gamely tries to redirect attention from our broken transportation to the magnificent geyser field before us. It's a long way back to Mammoth and we keep glancing over our shoulders at our NPS drivers, who are examining the damage. As it turns out, our drivers not only operate these complex machines but also know how to repair them, even in the field. So with some ingenuity, they do just that—all the while we are being treated to an extended talk on Yellow-stone geology. As we gratefully climb back on board the repaired coach, I am reminded how much we depend on experienced, professional staff in the national parks who know a lot—about a lot of things. On the return trip I sit next to our driver and learn that he is not only a

snow coach driver and mechanic, but also a plow and backhoe operator, backcountry carpenter, and forest fire fighter. Not a job I would outsource.

### Little Round Top, 2009

The fourth meeting of the Second Century Commission takes us to the rolling Pennsylvania countryside of Gettysburg National Military Park. We follow Commissioner James McPherson, Princeton professor and pre-eminent Civil War scholar, to the summit of Little Round Top. On this early spring day in March, we look over hallowed ground as far as the eye can see. Jim has given this tour countless times but his great passion for this place and its story has each of us transfixed.

The day before, the commissioners were asked to reflect on their experiences with the national parks. One commissioner referred to the parks as "the true heart of the nation" while another said that when she is in a park she feels a "profound sense of belonging." One commissioner said that parks represent "an uncommon commitment to a greater public good," and the "immersion in something fundamentally important to being a human being." Several described a "huge sense of relief" when they finally enter a park after passing through a gauntlet of adjacent development. Another commissioner recounted her desire to yell out to fellow park users, "Do you know how many people it takes to preserve this? Pay attention—this doesn't come free—it takes a lot to preserve this place." The commissioners all seemed to agree that as the nation's portfolio of parks and allied programs has expanded in size, diversity, and complexity, the imprint of the national park system on the public life of the nation has been expanded as well. The national park system has become a much larger civic endeavor than envisioned by its 1916 founders.

This change is evident in the new Gettysburg visitor center, a partnership project of the national park and the private Gettysburg Foundation. For the first time the stories of postwar reconciliation and battlefield reunions are told in the larger context of failed reconstruction, segregation, and African-American disenfranchisement in the years following the end of the Civil War. Visitor center exhibits, together with NPS educational programming, represent a seismic shift in the way the agency interprets the war. What we see at Gettysburg is the culmination of a concerted systemwide initiative, begun in 1997, when Civil War park superintendents decided to embrace the very best current scholarship and introduce the causes and consequences of the war into their interpretative programs. In a larger sense, what we are seeing at work at Gettysburg is an intentional effort to help people find broader context and meaning in the world around them. In the era of climate change, the civic engagement lessons of Gettysburg may also help prepare the national park system as a whole to advance public understanding and dialogue on the many critical issues we will face and choices that must be made.

### Clingmans Dome, 2009

The fifth and final commission gathering has taken us to Great Smoky Mountains National Park. It is early summer. Water seems to be flowing everywhere on the Tennessee side of the

park and the mountains are drenched in layered shades of green. So it is particularly startling, pulling off the winding road to Clingmans Dome, to see the panoramic vista of forested mountains so thoroughly pockmarked with dead hemlocks. These "redwoods of the east" have succumbed to an adelgid infestation that has been rolling east and north, leaving in its wake dying hemlocks in forests from Tennessee to Maine. As winter temperatures continue to moderate with climate change, the reach of this ecological tragedy inexorably advances.

By the side of road the commissioners are introduced to a small "integrated pest management team," a quiet, capable crew of young men and women who remain the last line of defense for the remaining hemlocks here. Armed with insecticidal oil sprays and predator beetles, they are making their stand along roadsides accessible to their vehicles and specialized equipment. In some ways, this battle may only be prelude to new assaults, yet unforeseen, abetted by the convergence of globalized disease and environmental stress—the harbinger of a climate reckoning that is first being played out in our national parks.

In his essay inaugurating this National Park Service Centennial Series, Dwight Pitcaithley wrote that "we should appreciate and nurture the capacity of parks to become models of healthy and sustainable ecosystems and to act as 'classrooms' where this nation's journey of liberty and justice become an essential part of our civic education." The National Park Service can fulfill a distinct and urgent national purpose by offering venues for public information and dialogue, demonstrating ecological restoration and resiliency, and providing opportunities for useful experimentation and experience with adaptation and sustainable practices. In a subsequent essay, Pitcaithley further suggests that to the degree national parks, along with their friends and partners, can play this role, they can encourage "increased environmental stewardship in backyards and city parks and public places where we live, not just visit."

FROM THE VANTAGE OF CLINGMANS DOME I've begun to reflect on a few of my own "lessons learned" from this journey:

- National parks must serve all Americans. We have seen in national parks, such as Santa Monica and Lowell, a vigorous commitment to inclusion, engaging diverse communities and demographic groups who have not been traditional park users and stakeholders. These efforts can ultimately make our parks increasingly more accessible, welcoming, and relevant. Film-maker Ken Burns described national parks to the commissioners as a "regenerative force" in the 21st century. The author Barry Lopez has written of national parks in the context of helping people live "decent and dignified lives."
- People's connections with their national parks are changing in fundamental ways. Traditional patterns of use, from episodic school field trips to annual family vacations, are being augmented by a deeper level of sustained engagement. We see more youth service-learning programs like that of the Eco-Helpers whom we saw at Santa Monica, park and school collaborations like the All-Taxa Biodiversity Inventories at Great Smoky Mountains and the Civic Collaborative at Lowell, public–private alliances like the Greater Yellowstone Coalition, friends groups, and a growing universe of community and philanthropic partnerships like the Gettysburg Foundation.

- This journey has reinvigorated my appreciation for what it means to be part of a system. People suggest that NPS often behaves more like a loose confederation. We have seen, however, what can be achieved when the National Park Service and its partners think and act like a system. The coordinated efforts of Civil War park superintendents to rethink their park interpretative programs, and the nationwide establishment of ecological inventory and monitoring networks, are notable examples. There is great power in sharing ideas, innovations, and experiences. Too often, unfortunately, exchange and learning are viewed as expendable and are the first things to be cut back, thus forgoing a system's greatest asset. In a larger global context, this has also been true for NPS investments in international cooperation, which have waned in recent years, when multilateral sharing of ideas, innovations, and experiences has never been more urgent.
- Horace Albright, the legendary NPS director, when he was nearing retirement, cautioned his staff: "Do not let the Service become just another government bureau." Today, the effects of growing centralized control, standardization, and privatization are threatening to bring about precisely what Albright warned against. It would be ironic if, in the name of efficiency, competition, and risk avoidance, we undermine the very relationships with long-term partners and cooperators so vital to the success of each the parks the commission visited.

As the National Parks Second Century Commission prepares its recommendations to the American people, we appear to be on the cusp of yet another pivotal "point of change" for our national park system. The "national park idea" will always be reinterpreted and reinvigorated for the times we live in, as it should be. Over the years, the concept has grown larger than the national park system itself. Commissioner Milton Chen, early in this journey, made the observation that "national parks build human capital." My own hope is that our national park system will continue to appeal to our best instincts: love for the American landscape, respect for nature and the lessons of history, and the possibility that, through acts of intentional conservation and stewardship, we might raise the bar on our responsibilities to each other and to the world around us.

**Rolf Diamant** is president of the George Wright Society and superintendent of Marsh-Billings-Rockefeller National Historical Park. He writes about conservation, parks, and protected areas, and is a contributing author to *The Conservation of Cultural Landscapes* (CAB International, 2006), *Reconstructing Conservation: Finding Common Ground* (Island Press, 2003), *Wilderness Comes Home: Re-wilding the Northeast* (University Press of New England, 2001) and *Twentieth-Century New England Land Conservation: A Heritage of Civic Engagement* (Harvard University Press, 2008). This Centennial Essay was expanded from an article by the author published in *Site/Lines*, a journal of the Foundation for Landscape Studies.

### Visitor Satisfaction and Support for Park Fees: Examining the Effects of Frontcountry, Backcountry, and Information in Rocky Mountain National Park

### Patricia A. Taylor and Burke D. Grandjean

MANAGERS OF NATIONAL PARK SERVICE (NPS) UNITS find themselves in a continual dilemma: providing for visitor satisfaction while at the same time protecting the natural, historical, and cultural resources of their parks. In pursuing these sometimes conflicting objectives, NPS managers are also constrained by the financial resources at their respective parks, which depend in part on revenues generated from park fees and on-site pass sales. Completing the circle, the willingness of visitors to support a park through paying fees or buying passes can be affected by their satisfaction with the visitor experience at that park.

In considering visitor experiences, managers at many national parks find it helpful to distinguish between backcountry and frontcountry. These two geographic areas of national parks may appeal to different types of park visitors, at different times of the year, and for different reasons. Backcountry visitors may require or desire more solitude and fewer encounters with other park visitors (Manning 2003), while frontcountry visitors may seek more timely services and less solitude, as scenic vistas and accessibility are of greater concern (Ormiston et al. 1998).

Visitor satisfaction may also reflect another dimension of visitation. In an information age, the quality and quantity of information about the park become part of the desired park experience. For example, many park visitors enter a park unaware of the qualities of that park, and require assistance in obtaining information about the contrasts of one geographic or historical area with another, length of trails, location of amenities, and the like. Other park visitors may be bewildered by the number of trails, exhibits, and experiences that are available in a national park. And of course, not infrequently a park volunteer or ranger encounters the question, "What is there to do here?" Enjoyment of the wide array of opportunities in a park must certainly be affected by the information to make desirable choices for activities.

Providing information in attractive and accessible forms is consistent with the larger culture within which we live. While many people visit national parks to find solitude, to hear the sounds of nature, to learn and to further educate themselves, or to view scenic beauty, they bring with them their ways of knowing from outside the park. For many visitors, these ways of knowing increasingly include nearly instantaneous weather information, online research across the globe, and global positioning system (GPS) location devices. While protecting parks and preserving their wilderness or backcountry areas, NPS managers also face increasing demands for information at their boundaries and in the frontcountry. These varied considerations all come into play in determining visitor satisfaction, which, in turn, may affect support for national parks.

Through a year-long survey involving nearly 1,300 face-to-face, on-site interviews with visitors at Rocky Mountain National Park (RMNP), we have isolated a number of dimensions of visitor satisfaction of interest to park managers. In particular, our research reveals the importance of visitor satisfaction with information and with frontcountry and backcountry experiences as influences on support for park fees. Although the research design was tailored to address some concerns specific to RMNP, as in any case study the results suggest generalizations applicable by managers at other NPS units. This paper presents the methods and key findings of that study.

### **Research design**

In 2004, under a cooperative task agreement with RMNP, we designed a survey of visitors in the southeastern area of the park to assess overall visitor satisfaction with their park experience and to examine visitor satisfaction with specific resources, services, and amenities. The goal of the study was to provide planning information to RMNP managers for their use in maintaining the balance between resource protection and visitation. This balance is especially difficult at RMNP, which faces development pressures from population growth along the park's southeastern boundary (known as the Highway 7 Corridor), leading toward Denver.

Early in the project, we met with park staff to develop the survey instruments to be administered in the southeastern park areas. Agreement was reached to station interviewers in the parking areas at Lily Lake, Longs Peak, and Wild Basin (see Figure 1). Additionally, sampling strategies were discussed, as well as issues relating to interviewer safety, respondent consent, and weather-related concerns.

The basic survey instrument was pre-tested initially on park volunteers at each site and revised appropriately. Three area-specific questionnaires were then pre-tested on up to nine park visitors at each of the three sites, and further revised according to the suggestions of the interviewers, park staff, and the research team. Final decisions regarding the research design, methods, and survey instruments are the responsibility of the authors.

Upon approval of the survey instruments by the Office of Management and Budget, training of volunteer interviewers began. The training protocols were developed and overseen by the first author, and implemented in cooperation with park personnel. Volunteer interviewers were given instruction guides, walked through the questionnaire and its purpose, and coached through practicing the questionnaire. By October 2004, interviewing commenced. In the summer of 2005, paid interviewers were recruited to augment the efforts of the volunteers; the same format for training was followed. A total of 1,371 visitors to RMNP were contacted for possible interview for this study, and 1,283 were interviewed, for a completion rate of 92.8%. During analyses for this study, 19 cases were dropped due to incomplete data, so that the final number of cases for most analyses is 1,264 cases or individuals.

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**Figure 1** The Highway 7 corridor of Rocky Mountain National Park. Source: Rocky Mountain National Park.

### Interviewing plan

By design, we sought to interview roughly the same number of people at each of the three sites in the park, and ultimately completed at least 412 interviews at each site. The interviewing ran for one year, even during the coldest days of December through February. Working with the Office of Research at RMNP, we systematically varied the days and time of day throughout the 52 weeks of interviewing, while concentrating the majority of the interviews in the summer months when visitation is highest. At the request of RMNP staff, five days were excluded from our sampling frame (Christmas Day, the Memorial Day three-day weekend, and July 4). However, New Year's Day did fall into the sample and we had one volunteer who managed to complete three interviews that day in the Longs Peak area. The time of day for the winter interviews was split into three blocks: approximately 8:00–11:00 AM, 11:00 AM–2:00 PM, and 2:00–5:00 PM. These times shifted slightly in the summer, to accommodate visitation times, as well as longer daylight hours; 7:00-11:00 AM, 11:00 AM-2:00 PM, and 2:00-6:00 PM.

The questionnaires were administered to park visitors as they approached parking areas returning from a walk or hike. The face-to-face interviews took approximately 10–12 minutes and were completed on paper forms. To prevent the responses of one group of visitors from affecting the responses of another group, we instructed the interviewers to wait an interval of one "group" of visitors between their interviews; they were also instructed to alternate between male and female visitors for potential participants. These rules were relaxed during the winter months when very few visitors could be counted at a particular location. The interviewing was completed on October 2, 2005, 12 months after it had begun.

### **Descriptive results**

The questionnaire administered to RMNP visitors contained questions tapping the level of satisfaction with separate park items, covering issues relevant to both frontcountry and backcountry visitors (such as parking lots, scenic pull-offs, hiking trails, campgrounds, rest and water facilities, interpretive programs, educational exhibits/signs, etc.). The answers to these questions were scored from 1 for "not satisfied at all" to 5 for "completely satisfied." Additional park questions provided information on the duration of park visit, whether visitors were willing to pay an increase in park fees, and demographic characteristics.

The mean values for the satisfaction items are presented in Table 1. Judging from the high mean values, most visitors were quite satisfied with the majority of the resources at RMNP. The item scoring the lowest levels of visitor satisfaction is the availability of drinking water (with a satisfaction level of only 3.22 out of a possible 5). The satisfaction score on the availability of park literature/exhibits is the only other score less than 4.0, although parking space, facilities in picnic areas, and backcountry toilets are also scored low compared with other items.

The fact that availability of drinking water scored low on visitor satisfaction is not surprising. Ninety percent of RMNP is designated as wilderness, with little development. Yet with a large urban population nearby, and RMNP's location among the western parks, many visitors may enter the park without sufficient supplies. Indeed there are several entrances to the park that provide no appreciable services. Moreover, the Lily Lake area was only recently added to the park through a bequest, and for much of the year of interviewing the Lily Lake Visitor Center was closed. A second area of this research project included Long's Peak, which is notable as the best access to the only 14,000-foot peak in the park. During the busiest days of late July and August, the trail may have over 200 hikers attempting to summit, and numerous other hikers heading toward nearby destinations. Yet there is only one water spigot located next to the information cabin at the trailhead and only one sign noting the presence of the water.

### **Multivariate analyses**

Using principal components factor analysis, we found that three dimensions of visitor satis-

what satisfied, 3 be	ing neither satisfi	ed nor
dissatisfied with t	hat part of your vi	sit.)
N	Mean	Median
1264	4.69	5.00
1262	4.52	4.00
1263	4.57	5.00
1263	4.05	4.00
1264	4.38	4.00
1264	4.10	4.00
1264	3.22	3.00
1264	3.96	4.00
1264	4.34	5.00
1263	4.62	5.00
1263	4.42	5.00
1263	4.16	4.00
1264	4.27	4.00
1264	4.08	4.00
1263	4.52	4.00
1264	4.75	5.00
	N 1264 1262 1263 1263 1263 1263 1263 1264 1264 1264 1264 1264 1263 1263 1263 1263 1263 1263 1263 1263	N         Mean           1264         4.69           1262         4.52           1263         4.57           1263         4.05           1264         4.38           1264         4.38           1264         4.38           1264         4.38           1264         4.38           1264         4.38           1264         4.42           1263         4.62           1264         4.34           1263         4.62           1264         4.34           1263         4.62           1263         4.62           1263         4.62           1263         4.62           1263         4.62           1263         4.62           1263         4.62           1263         4.62           1264         4.27           1264         4.08           1263         4.52           1264         4.52           1264         4.75

Survey Questions. Could you tell me how satisfied you were with the following in this area of the park? (On a scale of 5 of 5

... the availability of ranger led programs?

 Table 1
 Satisfaction survey questions with number of respondents, means, and medians.

faction can be identified in the data described in Table 1. These three dimensions are *front-country satisfaction* (which includes satisfaction with roads into the areas visited, restrooms, parking space, the number of picnic areas, the facilities at picnic areas, pedestrian safety in the parking lots, and access for the disabled); *backcountry satisfaction* (which includes the questions for availability of water, trail signs, backcountry toilets, and developed trails); and *park information satisfaction* (which included questions on park kiosks, park literature, availability of park personnel, and ranger programs). Neither the quality of educational exhibits nor that of scenic pull-offs showed an underlying association with any of the three main factors; therefore, these items were deleted from the scale construction.

1264

4.14

Three summary scales were created, each one calculated as the average of the corresponding items so that the resulting scales range from 1.0 to 5.0. We then performed a reliability analysis on each scale and obtained a Cronbach's alpha of .64 for the frontcountry scale; .62 for the backcountry scale; and .60 for park information scale. Alpha provides a lower-bound estimate of the proportion of variance in a scale that is shared with a hypothetical perfect measure of the same construct (see Cronbach 1970). Generally, alphas of .6 or higher are considered evidence of sufficient reliability in a scale (Bartee et al. 2004).

For the park manager, being aware of these three dimensions of visitor satisfaction can help to focus park efforts toward assisting visitors, both before and during visits. And as suggested by discussions with park managers and staff, park personnel may need to help guide

4.00

the visitor to those activities for which he/she is suited by experience and preparation (Intermountain CESU 2008:3). Managers can decide to allocate resources to improving the visibility of facilities in those areas which are lower in visitor satisfaction, or, if needed, improving the facilities themselves. In addition, the relevance of these three dimensions of satisfaction can be seen in how they relate to visitor support for park fees.

As noted by Silver (2005) as well as others (LeRoy 2005; Shultis 2005), the Recreation Fee Demonstration Program of 1996 (Fee-Demo) and the subsequent Federal Lands Recreation Enhancement Act of 2004 (FLREA) have placed more entrepreneurial responsibilities on public land managers. The Fee-Demo program and the FLREA have worked to "give the federal land management agencies a chance to demonstrate to Congress that a wider range of recreation fees than had been authorized by the provisions of 16USC460l(6a) could be effectively charged and collected. The visitor who paid a fee could reasonably expect that on some future visit, the restrooms would be cleaner or the picnic tables more plentiful than would have been the case had he or she not paid the fee" (Silver 2005:70).

Knowing how such fees are related to visitor satisfaction becomes important as managers try to determine how to protect the natural, historical, and cultural resources of their public lands, while at the same time enhancing the visitors' feeling of satisfaction with their visits to public land sites. We asked visitors to RMNP two questions regarding the payment of fees to the park. We asked if, on their current visit to RMNP, they had paid an entrance fee, used a park pass, used a National Park Pass, the Golden Eagle Passport, Golden Age pass, re-entered the park with a pass from earlier in the week, or paid nothing at all (the *payfee* variable). Because of the many access points to RMNP along the Highway 7 corridor, it is quite easy for visitors to avoid those entry gates where fees are collected and passes checked. The *payfee* variable was originally scored 1 through 7 as a nominal variable reflecting the various types of fee payment. But for statistical analysis, we collapsed the first six categories into one, so that we had a dichotomous dependent variable scored 0 and 1: 0 for not paying any fee, and 1 for paying some kind of fee to enter the park. We also asked visitors if they would favor increasing park entrance fees by \$3 "for park improvements" (increasefee). The *increasefee* variable was originally scored 1 through 3 as an ordinal variable: one for "decrease the fee," two for "leave as is," and three for "increase the fee." For the analysis reported here, the *increasefee* variable was also dichotomized: 0 for wanting to decrease the fee or leave it as is, and 1 if willing to see the fee increase. (We also ran the analysis collapsing "leave as is" with "increase the fee," and obtained similar results.)

To determine the relationship of the different dimensions of visitor satisfaction with each of the fee variables, we used binary logistic regression. We first regressed *payfee* and *increasefee* onto each of the satisfaction scales separately, controlling for age, education level, and ethnicity (white—nonwhite) of the respondents, and then on all three scales at once (with the same demographic controls). The results of these analyses are presented in Table 2.

In logistic regression, an estimated effect may be expressed as an odds ratio, which is the multiplicative factor by which the odds of a "Yes" on the dependent variable change for each unit increase in the independent variable. An odds ratio of greater than 1.0 indicates a positive relationship; i.e., as the independent variable increases, the odds of a "Yes" increase. An odds ratio between 0 and 1.0 indicates an inverse relationship. Table 2 reports the relevant

1.0	Dependent Variable		
Independent Variable(s)	Payfee	Increasefee	
	Odds Ratio	Odds Ratio	
Park Information Scale	1.831***	1.442***	
Frontcountry Park Scale	.789	1.027	
Backcountry Park Scale	1.394***	1.396**	
Park Info	2.192***	1,299#	
Frontcountry	.580***	.876	
Backcountry	.980	1.315	

 Table 2
 Logistic regression models.

odds ratios, and shows which ones differ significantly from 1.0, which is the value of the odds ratio that corresponds to no relationship at all between the variables.

The results in the upper panels of the table suggest that satisfaction with frontcountry facilities is not significantly related to whether a visitor paid a fee to enter the park, nor to whether the visitor would favor an increase in park fees. For *increasefee* the odds ratio of 1.027 is only slightly greater than 1.0, while for *payfee* the odds ratio of .789 is a little less than 1.0; neither differs significantly from 1.0. The bottom panel of the table modifies this conclusion somewhat, as will be discussed shortly.

The upper panels further suggest that satisfaction with trail signs, backcountry toilets, developed trails, and the like is related to a willingness to pay the entrance fee and to raise entrance fees. The odds ratios are about 1.4 (1.394 and 1.396), which indicates that a oneunit increase in backcountry satisfaction (e.g., a score of 4.5 on the scale versus a score of 3.5) is associated with 40% higher odds of a "Yes" on *payfee*, and also on *increasefee*. These odds ratios are both statistically significant, controlling for the effects of age, level of education and ethnicity. However, as shown in the bottom panel of the table, they fade to insignificance when controls are added for other dimensions of park satisfaction.

Individuals who are more satisfied with park information are more likely to have paid an entrance fee and are also more likely to support raising park entrance fees. These effects are found with only the demographic controls, and remain evident when the other dimensions of satisfaction are also controlled. An increase in satisfaction with park information of one unit is associated with an approximate doubling of the odds of paying an entry fee. This is shown by the significant odds ratio of 1.831 with only demographic controls, which increases to 2.192 when the other scales are controlled as well. Satisfaction with park information is also significantly related to support for raising the fees, but not as strongly. A one-point increase in satisfaction raises the odds of supporting higher fees by about 44% with only demographic controls (odds ratio = 1.442), or by about 30% controlling also for the other satisfaction scales (odds ratio = 1.299). Clearly, such things as talking with rangers, attending programs, the availability of different kinds of information from kiosks and volunteers are important to the satisfaction of visitors and their willingness to support the park monetarily.

Indeed, as revealed in the bottom panel of the table, satisfaction with information appears to be the linchpin that links park satisfaction to support for park fees. Satisfaction with information remains a positive predictor of both *payfee* and *increasefee*, even with the two other dimensions of satisfaction controlled. Backcountry satisfaction, on the other hand, drops to insignificance in this last model, and frontcountry satisfaction becomes a negative predictor. This suggests that contacts with representatives of the park in some form have a more direct impact on support for park fees than experiences in the backcountry or the presence of amenities in the frontcountry. Park information may help visitors to have a more satisfying experience, whether in the frontcountry or in the backcountry, by letting them know what to expect.

As an aside, we speculate that the modest inverse association between frontcountry satisfaction and fee payment in the bottom panel of the table may reflect a feedback effect. That is, with other dimensions of satisfaction held constant, the frontcountry experience may be perceived as more gratifying by those who are enjoying it for free. However, this result may well be idiosyncratic to RMNP, where the many access points along the Highway 7 corridor make it easy for visitors to avoid the entry gates where fees are collected and passes checked.

### Conclusions

The Recreation Fee Demonstration Program began as a means to allow parks some control over their own revenues. To be able to collect gate fees is a mechanism whereby park managers can gain financial resources to help maintain the natural and cultural resources in our national parks. The research at Rocky Mountain National Park suggests that visitors obtain more satisfaction if they have the appropriate information about the park. In the binary logistic regression, paying fees and willingness to pay higher fees appear at first to be associated with both satisfaction with park information and satisfaction with the backcountry experience. In this sense the frontcountry—parking lots, picnic areas, restrooms, picnic areas' facilities, pedestrian safety, and access for the disabled—may, ironically, be part of the back-

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ground of the park experience. That is, these things are so taken for granted that visitors do not notice their presence. The exigencies facing the backcountry hiker and camper, however, suggested at first that the facilities that are available are important to satisfaction with the backcountry visit.

However, when all three scales are entered simultaneously into the regression analysis, only satisfaction with park information is positively related to both fee payment and support for higher fees. Satisfaction with ranger programs, the availability of park personnel, the information on the kiosks and the like is associated with a greater willingness to pay an increase in fees, as well as having paid the fee for that day's visit.

Thus, in an information age, the quality and quantity of information about the park become part of the desired park experience. Many visitors enter a park unaware of its qualities, and require assistance in obtaining information about the contrasts of one geographic or historical area with another, length of trails, location of amenities, and the like. Other park visitors may be bewildered by the number of trails, exhibits, and experiences that are available in a national park. Enjoyment of the wide array of opportunities in a park must certainly be affected by the information available to make desirable choices for activities.

Qualitative findings from our year of quantitative data collection support these conclusions. For example, survey interviewers who were dressed in the park volunteer uniform not only had excellent completion rates for the face-to-face interviews, but other visitors would approach them to ask questions about the park. On more than one occasion, the senior author (wearing the shirt and cap of a park volunteer) heard a visitor say "There's one" and approach her with a question. Often, the ensuing conversation made it clear that the visitor had mistaken the garb of a volunteer for that of a park ranger, since the two uniforms are superficially quite similar. Given the high regard for park rangers and the National Park Service in general, it is not surprising that visitors who are satisfied with the information they receive from a ranger or other park source are more supportive of park fees. The park ranger is an icon for our national parks, and embodies the protection of those characteristics that Nash (1967), Stegner (1969), and others have used to describe our physical landscape. The public's willingness to pay increased fees is a signal that they too value the natural landscape "just because it is there" (Stegner 1969).

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### Evaluating the Quality of Biological Objectives for Conservation Planning in the National Wildlife Refuge System

### Richard L. Schroeder

**THE IMPORTANCE OF DEVELOPING MEASURABLE OBJECTIVES** in natural resource management plans has been emphasized by numerous authors (e.g., Slocombe 1998; Adamcik et al. 2004; Butler and Koontz 2005; Schroeder 2006; Edvardsson 2007). Measurable objectives are critical not only in management plan formulation, but are essential for monitoring progress toward achievement and implementation of these plans (SER 2004; Tear et al. 2005). Since 1997, the national wildlife refuge system of the US Fish and Wildlife Service (USFWS) has been operating under the directives of the 1997 Refuge Improvement Act. This act and subsequent policies and guidance developed by USFWS have provided important new direction to the management of national wildlife refuges. A key component of the law directs USFWS to develop comprehensive conservation plans (CCPs) for the more than 500 refuges in the system, and to manage the refuges according to these plans. At 38 million hectares, the national wildlife refuge system is the largest network of public lands reserved for conservation of native species and their habitats (Meretsky et al. 2006).

In June 2000, USFWS published its *Refuge Planning Policy* (codified at 602 FW in the USFWS servicewide policy manual; USFWS 2000a) and in January 2004, the agency issued a guidance document titled *Writing Refuge Management Goals and Objectives: A Handbook* (Adamcik et al. 2004). These documents provide very detailed guidance related to developing the biological objectives in CCPs, which describe the desired future biological conditions on a refuge. The biological objectives in CCPs are the core of the plan. Ideally, these objectives describe the desired future conditions on a refuge in measurable detail and are based on sound science. For the past 10 years, I have been working with USFWS to provide technical assistance and training in the area of developing high-quality biological objectives for CCPs that conform to USFWS policy and guidance documents. In this paper, I present the results of a review of the scientific quality of biological objectives in 60 recently completed CCPs, provide detailed analyses of specific objectives of various levels of quality, and comment on the challenges to developing objectives that adhere to the criteria developed by USFWS.

### Methods

I reviewed the USFWS Planning Policy and the goal and objective handbook for key provi-

sions and requirements for developing biological objectives. The definition of an objective is provided in 602 FW 1, the refuge planning overview, June 21, 2000:

*Objective.* A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Make objectives attainable, time-specific, and measurable.

Requirements for objectives are provided in 602 FW 3, the comprehensive conservation planning process. It is noted that this policy "establishes minimum requirements for all CCPs." A particularly pertinent goal of comprehensive conservation planning is to "support management decisions and their rationale by using a thorough assessment of available science derived from scientific literature, on-site refuge data, expert opinion, and sound professional judgment" (602 FW 3.3.D.). Key provisions of the *Planning Policy* for development of biological objectives include the following:

- Word objectives so it is clear what we can measure during monitoring to assess progress toward their attainment.
- Develop detailed, measurable objectives using available scientific literature and other appropriate information.
- Document in a short narrative summary the rationale, including appropriate literature citations, that supports each objective.

The *Planning Policy* also states that during development of objectives, the goal and objective handbook should be consulted. This handbook provides more specific guidance on developing biological objectives and clearly states that:

All objectives must possess five properties. Each objective must be: (1) Specific, (2) Measurable, (3) Achievable, (4) Results-oriented, and (5) Time-fixed.

These properties (known by the acronym SMART) are described in detail in the handbook. The handbook requires that objectives be based on "sound, documented, scientific information," and that the rationale for objectives should be documented, including, at a minimum, a description of the logic, assumptions, and sources of information including citations.

I developed a system to rate the scientific quality of biological objectives in management plans (Schroeder 2006). The rating system was based on policies and guidance previously described for USFWS, and serves as a standardized method to rate the scientific quality of biological objectives in resource management plans. This rating system consists of the four levels of quality for each of three criteria:

1. How well does the objective meet the SMART criteria (specific, measurable, achievable, results-oriented, and time-fixed)?

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1 = Poor. Objective meets none of the SMART criteria.

2 = Fair. Objective meets 1-2 of the criteria.

3 = Good. Objective meets 3-4 of the criteria.

4 = Excellent. Objective meets all 5 of the criteria.

2. What is the extent of the rationale/narrative that explains the assumptions, logic, and reasoning for each biological objective?

- 1 = Poor. None provided.
- 2 = Fair. Minimal or poor explanation or only a few parts of the objective explained.
- 3 = Good. Expanded explanation, understandable, but not all parts of objective explained.
- 4 = Excellent. Thorough, understandable explanation of all parts of the objective.

3. How well was available science used in the development of the biological objectives? (Note: general sources include materials such as field guides and overview texts; high-quality sources include materials such as articles from scientific journals.)

- 1 = Poor. Very few or no science sources cited.
- 2 = Fair. Limited number of science sources provided, and sources mostly general.
- 3 = Good. Limited to many science sources provided, and sources mostly of high quality.
- 4 = Excellent. Extensive amount of science sources provided, from high-quality sources.

I reviewed 60 recently completed CCPs (publication dates ranging from September 2005 through September 2007, Table 1), and rated each pertinent biological objective using the three criteria presented above. Pertinent objectives were those that considered biological management actions and not those that related to items such as further research, developing a plan, or establishing partnerships. I rated each biological objective on how well they met each criterion. Then, I computed average scores for each objective and a single average score for each CCP. I grouped CCPs by overall average score into the categories of "poor," "fair," "good," and "excellent," as follows: poor = 1.00-1.74; fair = >1.75-2.49; good = >2.50-3.24; and excellent = >3.25-4.00. Even though a numerical score is assigned to each criterion, there is still some degree of subjectivity in the rating system. To help to ensure a consistent approach and to get a sense of the range of quality in the CCP objectives, I first reviewed a sample of CCPs without assigning a rating score. I then conducted the final reviews over a short (three-week) time period, to provide a consistent approach in assigning the rating scores.

### Results

The range of possible scores for assessing the quality of biological objectives in an individual CCP is 1 (lowest quality) to 4 (highest quality). The overall average score for all CCPs was 1.89 (SD = 0.59; Table 2). There was a wide range in individual CCP scores, from a low of 1.00 to a high of 3.78. Overall scores for the three criteria were: Criteria 1 (SMART objec-

National Wildlife Refuge(s)	USFWS Region	National Wildlife Refuge(s)	USFWS Region
Tumbull	1	Roanoke River	4
McNary and Umatilla	1	Chickasaw	4
Washington Islands	1	Hatchie	4
Cabeza Prieta	2	Lower Hatchie	4
Salt Plains	2	Crocodile Lake	4
Maxwell	2	Okefenokee	4
Hagerman	2	Vieques	4
Mingo	3	Hobe Sound	4
Horicon and Fox River	3	St. Marks	4
Upper Mississippi River	3	Shawangunk	5
Merritt Island	4	Missisquoi	5
Mississippi Sandhill Crane	4	Rachel Carson	5
Grand Cote	4	Chesapeake Marshlands	5
D'Arbonne	4	Long Island	5
Choctaw	4	Great Dismal Swamp	5
Reelfoot and Lake Isom	4	Long Lake	6
Wheeler	4	Rainwater Basin WMD	6
Pelican Island	4	Sand Lake	6
Lacassine	4	Lacreek	6
Cedar Island	4	Laramie Plains	6
Currituck	4	Kirwin	6
Pea Island	4	Souris River Basin	6
Sabine	4	Medicine Lake	6
Alligator River	4	Arrowwood	6
Cameron Prairie	4	Kodiak	7
Catahoula	4	San Diego Bay	8
Pocosin Lakes	4	Sacramento River	8
St. Catherine's Creek	4	Stone Lakes	8
Mackay Island	4	San Joaquin River	8
Big Branch Marsh	4	Marin Islands	8

 Table 1
 List of CCPs analyzed, by USFWS Region.

tives), average of 2.01 (SD = 0.71, range 1.00–3.66); Criteria 2 (documentation), average of 2.19 (SD = 0.52, range 1.00–3.90); and Criteria 3 (science), average of 1.47 (SD = 0.69, range 1.00–3.78).

Thirty of the 60 CCPs received an overall average score of "poor" and 23 were rated as "fair." Six CCPs received an overall score of "good," and one was rated as "excellent."

Few individual biological objectives received the highest possible score (4) for all three of the evaluation criteria. An example of such an objective from the CCP for Lacreek National Wildlife Refuge can be used to illustrate the characteristics of high-quality biological objectives. The Lacreek CCP calls for restoring at least 20% of the upland mixed-grass plant community to the conditions described in the following biological objective:

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USFWS Region	Number of CCPs	Criteria 1 Average Score (SD)	Criteria 2 Average Score (SD)	Criteria 3 Average Score (SD)	Average CCP Score (SD)	Overall Rating
1	3	2.24 (0.41)	2.48 (0.19)	1.63 (0.22)	2.12 (0.24)	Fair
2	4	1.63 (0.51)	2.04 (0.07)	1.04 (0.07)	1.57 (0.21)	Poor
3	3	2.81 (0.25)	2.31 (0.23)	1.34 (0.16)	2.15 (0.13)	Fair
4	29	1.58 (0.49)	1.89 (0.40)	1.13 (0.29)	1.53 (0.36)	Poor
5	6	2.25 (0.52)	2.69 (0.36)	2.04 (0.55)	2.36 (0.46)	Fair
6	9	2.99 (0.43)	2.78 (0.55)	2.47 (0.96)	2.75 (0.56)	Good
7	1	2.33	2.33	1.67	2.11	Fair
8	5	2.12 (0.50)	2.1 (0.09)	1.24 (0.20)	1.82 (0.24)	Fair
Overall	60	2.01 (0.71)	2.19 (0.52)	1.47 (0.69)	1.89 (0.59)	Fair

 Table 2
 Average scores for objectives based on the three rating criteria and CCPs, by USFWS

 Region.

In 5 to 10 years, increase floristic quality assessment C score by greater than 10 percent in patches greater than or equal to 125 acres, with vegetation measuring greater than 16 inches in height, as measured during the nesting season (May to July 15) within these patches, and greater than 164 feet from trees greater than 10 feet in height.

This objective meets all of the SMART criteria. It is specific, measurable, achievable, results-oriented, and time-fixed. The rationale statement that accompanies the objective explains the assumptions, logic, and reasoning for the objective in a thorough and complete manner. The rationale explains that the objective was developed based on the habitat needs of grassland birds of management concern, and these habitat needs are summarized in both the text and an accompanying table. The floristic quality assessment and C score are explained in the text as well, along with the logic explaining why it is assumed the C score can be increased by 10% within a 5-to-10-year period. The rationale statement is also thoroughly supported by high-quality scientific sources and includes 48 separate references to the scientific literature that were used to develop the objective. This level of documentation was exceptional, and it should be pointed out that objectives from other CCPs scored well with many fewer science citations. The key consideration is that in order to score well, the objective must be shown to be solidly based on high-quality science.

In contrast to the above example, there were several objectives in CCPs that received the lowest possible score (1) for all three of the evaluation criteria. An example of such an objective can be used to illustrate the characteristics of biological objectives that do not meet the requirements outlined in the evaluation criteria:

Provide favorable feeding, nesting, and roosting habitat for trust species on 75% of the refuge.

This objective does not meet the SMART criteria. It is not specific, measurable, achievable, results-oriented, or time-fixed. Although the objective does specify a 75% figure, it is not at all clear what conditions must exist on the 75% of the refuge to satisfy the objective. The phrase "favorable feeding, nesting, and roosting habitat" is vague and subjective without further detailed descriptions of exactly what is meant. This objective was presented with no supporting rationale statement and no scientific supporting materials or citations. It would not be possible to accurately monitor progress toward achievement of this objective, because it lacks specific and detailed components.

### Discussion

In a review of several USFWS policies related to the national wildlife refuge system, Fischman (2007) noted that "mere promulgation of policies does not conservation make." This sentiment was also expressed by Butler and Koontz (2005) in their assessment of the implementation of ecosystem management objectives in the US Forest Service, when they stated that "policy adoption is not the same as policy implementation." I believe these assessments also apply to the development of biological objectives for CCPs. The USFWS policies related to developing objectives are well constructed and provide detailed guidance. However, the biological objectives in the majority of CCPs I examined do not succeed in meeting the policy guidelines.

Furthermore, this study shows no significant improvement compared with my initial study (Schroeder 2006). The overall average score of 1.89 for the 60 CCPs in the current analysis was not significantly different from the overall average score of 1.73 for the first 60 CCPs completed by USFWS (t-test, P = 0.11).

There are several reasons why it is important for CCPs to contain biological objectives that meet USFWS policy requirements. The biological objectives in CCPs express what the national wildlife refuge system hopes to accomplish on the ground through its management actions. USFWS policy makes it clear that objectives provide the basis for monitoring refuge accomplishments, and, as noted earlier, the policy requires CCP objective writers to "word objectives so it is clear what we can measure during monitoring to assess progress toward their attainment." In addition, the Refuge Improvement Act of 1997 requires that national wildlife refuges be managed "in a manner consistent with the plan." Further, one of the goals stated in the refuge planning policy is to "provide a basis for adaptive management by monitoring progress, evaluating plan implementation, and updating refuge plans accordingly."

If USFWS is to be able to manage in a manner consistent with the plans, and to practice adaptive management by monitoring progress, then the biological objectives in the plan must be specific and measurable, as recognized by USFWS' own policy. If the objectives lack specificity and detail, as the majority do, then USFWS will be unable to measure progress toward their achievement, and thus, will be unable to know if they are indeed managing refuge lands in a manner consistent with the plans.

I am in agreement with Tear et al. (2005) that management plan objectives are hypotheses, and that the scientific method should serve as an important guide in the objective-setting process. It is clear to me that there are very few, if any, aspects of habitat and biological management on national wildlife refuges where a desired condition (as described in the objective) can be assured to be created upon implementation of selected management actions. Our understanding of wildlife-habitat relationships, plant ecology, and ecological processes is simply too limited to assure desired outcomes. Management of natural systems is not laboratory science and results are often uncertain and unpredictable. Biological objectives in CCPs that summarize existing scientific knowledge and present a reasonable hypothesis can be empirically tested and refined over time, through implementation and monitoring. It is only in this manner that USFWS will be able to practice adaptive management as it begins to implement and monitor CCP objectives. Objectives that are vague, ambiguous, and subject to interpretation simply cannot be accurately monitored, and thus such objectives provide no basis for adaptive management.

As noted in USFWS policy, a key component of developing high-quality biological objectives is to conduct a comprehensive assessment of the existing scientific literature. This is not a trivial task. Pullin et al. (2004) noted that conservation managers in the United Kingdom rarely based plans on the primary scientific literature because the managers found that it was too time-consuming to locate, access, and read. The failure to do so, however, jeopardizes the scientific quality of management plans.

A challenge in applying a standardized method to evaluate the biological objectives in CCPs is that there is a wide range of biological issues, needs, and concerns represented across national wildlife refuges. There is variation in refuge size and biological complexity. Some refuges contain species and habitats that are better studied or understood than others. However, it is rare that there is a paucity of available scientific information upon which to base a biological objective. In a collaborative project with the biologist at Tewaukon National Wildlife Refuge in North Dakota, we studied the literature related to tallgrass prairie restoration and management. We summarized over 100 scientific sources in a 15-page report (Schroeder and Askerooth 1999) that served as the basis for several of the tallgrass prairie objectives in the Tewaukon CCP (USFWS 2000b). For Long Lake National Wildlife Refuge, Laubhan et al. (2006) published a biological assessment of the refuge that has more than 100 scientific citations and which was used to support the biological objectives in the CCP (USFWS 2006). This level of effort is not required for all CCPs, but these reports can serve as examples of the availability of scientific literature on which to base the biological objectives in CCPs. In many of the 60 CCPs I reviewed, documentation of scientific sources of information was either sparse or completely lacking. However, there were notable exceptions, and those CCPs with extensive science citations generally scored well on the three evaluation criteria.

Through passage of the 1997 Refuge Improvement Act and subsequent policy development, USFWS has embarked on a rigorous, science-based approach to planning and land management for the national wildlife refuge system. Based on my prior analysis of the first 60 completed CCPs (Schroeder 2006) and, now, 60 more recently completed ones, it is clear that there is more progress yet to be made in the development of high-quality biological objectives across all CCPs. As noted by Meretsky et al. (2006), the mandates of the 1997 act build on a century of science-based management aimed at making the refuges the nation's premier conservation reserve system. The challenge for USFWS is to continue building on this legacy, and to strive for further improvements in the quality of the biological objectives in CCPs.

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# Why is Biodiversity Conservation Important in Protected Landscapes?

### Nigel Dudley

OVER THE PAST FEW YEARS, THE FUNCTION, PURPOSE, AND EVEN LEGITIMACY of protected landscapes and seascapes has been the subject of a surprisingly intense debate. Protected landscapes are not natural or near-natural ecosystems, such as rainforests or mangrove swamps, but areas that have been culturally defined by human management, often over periods of hundreds or thousands of years, which retain and often develop important natural, aesthetic, spiritual, and cultural values. IUCN (the International Union for the Conservation of Nature) sums them up as places "where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value" (Dudley 2008).

On the one hand, more and more countries are designating protected landscapes (defined by IUCN as protected area category V, see below) and promoting these as major contributions to national conservation strategies. But this success has resulted in a background grumbling of concern about the efficacy of the approach, culminating in an influential paper (Locke and Dearden 2005), which argued that designations such as protected landscapes or extractive reserves (IUCN category VI) have little to do with biodiversity conservation and, whatever their other values, such places should no longer be recognized as "protected areas." Perhaps even more significantly, many conservation planners and nongovernmental organizations (NGOs) tacitly ignore such designations in national or ecoregional conservation plans, protected area gap analyses, or land purchase strategies, and over time this perception has been taken up by a number of governments.

The criticism leveled at the less-restrictive protected area approaches was quite specific. It was not questioning the legitimacy of landscape protection approaches, nor denying the importance of cultural landscapes and broad-scale approaches, but was challenging the potential of such places to contribute significantly to biodiversity conservation. It was not saying "get rid of them," but rather "don't count them too heavily in conservation strategies." This perspective has, in turn, attracted some careful responses (see e.g. Mallarach et al., forthcoming) and a great deal of debate within international protected areas policy. The following article provides some of the background to the debate, then looks at different points of view and draws together a synthesis. Given that the issue attracts strong opinions, for transparency's sake I will summarize my own views during the course of the article.

### Who decides?

First, we need to be clear about why the debate is important. Does it matter what a few academics or NGOs think is or is not a protected area? And who decides these things anyway? Ultimately, national conservation strategies are set by governments, which are variously influenced by their voters, in the case of democracies, or at least the weight of public opinion; by advocacy groups that take many different forms, both for or against conservation; and by a range of regional or international institutions and agreements. Over time, the significance of the last of these, the various intergovernmental conservation processes, has grown increasingly important as it has become fashionable for politicians to show off their environmental credentials on the global stage. This means that the question of what "counts" as a protected area gains significance, both from the practical perspective of whether or not they perform the functions claimed for them, and more subtly for political questions relating to equity between nations. If one country gains international kudos for a system of protected areas that other countries regard as not really being protected at all, the international process is undermined and subverted.

For the last few decades, the main arbiter of what counts as a protected area has been IUCN. Its members (which include both governments and NGOs) agree collectively on both the definition of a protected area and on a range of different management approaches that are deemed acceptable within protected areas. The latter are described in a typology of six different management approaches known as the IUCN protected area categories. While application of categories is voluntary, most of the world's governments accept and apply them, with an increasing number formalizing them in law (Dillon 2004). The IUCN protected area definition, categories, and accompanying guidance have recently been revised (Dudley 2008) from the previous 1994 edition (IUCN and WCMC 1994), following a detailed analysis coordinated by Cardiff University in Wales (Bishop et al. 2004) and a long consultation within IUCN and its members (see Dudley, forthcoming). The process of revision stimulated a sudden burst of interest in the opportunities and limitations of what is meant by the term "protected area," particularly with respect to the broader landscape approaches to protection.

### The new IUCN protected areas definition and categories

The result is not radically different from the interpretation of 1994, but it does contain some significant reinterpretations and changes of emphasis. Most important, the definition of what IUCN recognizes as a protected area has changed. In 1994 it read:

An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

The 2008 version, after tortuous debate within the IUCN World Commission on Protected Areas (WCPA), states that a protected area is:

A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

The 1994 definition could be read as meaning that "associated cultural resources" were of equal or even superior importance to "protection and maintenance of biological diversity" and some IUCN members interpreted it in this way. The 2008 definition gives a clear indication that "nature conservation" is given higher significance than "associated ecosystem services and cultural values." More important still, the definition is accompanied by a series of principles, the most relevant in the current context being: "for IUCN, only those areas where the main objective is conserving nature can be considered protected areas; this can include many areas with other goals as well, at the same level, but in the case of conflict, nature conservation will be the priority." In other words, when the chips are down nature conservation should have priority in protected areas. This was not always the case before; guidance in 1994 stated explicitly that conservation of biological diversity was secondary to wilderness conservation in wilderness areas and secondary to protection of specific cultural/natural features, recreation and tourism, and maintenance of cultural/traditional attributes in protected landscapes.

On the other hand, the wording has changed from "biological diversity" to "nature conservation," a broader term, which certainly embraces geological and geomorphological diversity and is also more generally open to different cultural interpretations of what constitutes "nature." The restatement also includes greater emphasis on delivery; the 1994 definition was explicitly based on objectives rather than achievement, while the use of the phrase "to achieve long term conservation" (my emphasis) implies that effectiveness is included within the definition.

The six categories (one divided into two sub-categories) remain roughly the same, although there are changes in emphasis and the new guidelines go further than before in attempting to distinguish one category from another. They are summarized in Table 1.

The new guidelines were launched at the October 2008 World Conservation Congress in Barcelona, with an accompanying resolution supporting the use of all the categories for conservation. Signatories of the resolution included some of those who had earlier been arguing against categories V and VI, indicating that the new interpretation has gone a long way to quieting concerns.

### Roots of the debate

The new publication provides some clarification but will certainly not end the debate; IUCN's statements remain simply guidance and governments can and will ignore them when they wish.<sup>1</sup> There is no reason to expect that governments will suddenly turn round and announce that certain national designations are no longer "protected areas." But what does seem to have occurred is a subtle shift in the underlying philosophy behind protected areas towards an increased emphasis on nature conservation.

Or more accurately, the balance of power has shifted in that direction. Two views exist

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No.	Name	Description
Ia	Strict nature reserve	Strictly protected areas set aside to protect biodiversity and also possibly geological/ geomorphological features, where human visitation, use, and impacts are strictly controlled and limited to ensure protection of the conservation values.
Ъ	Wilderness area	Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition
п	National park	Large natural or near-natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational, and visitor opportunities.
ш	Natural monument or feature	Areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave, or even a living feature such as an ancient grove.
IV	Habitat/species management area	Areas that aim to protect particular species or habitats and where management reflects this priority. Many category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.
v	Protected landscape or seascape	An area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural, and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.
VI	Protected areas with sustainable use of natural resources	Areas conserving ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level, non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

 Table 1
 Revised IUCN protected area categories. Source: Dudley 2008.

about protected landscapes,<sup>2</sup> both strongly held by their supporters. One is that protected landscapes should and can play a major role in biodiversity conservation strategies and the delivery of conservation targets; in other words that *all* protected areas ought to be selected and designed using the best available conservation science to maximize the amount of biodiversity that they protect. The other view is that protected areas and particularly protected landscapes have a far wider role than just the protection of biological diversity and that a narrow focus on biodiversity conservation risks losing many cultural, social, broader environmental, and spiritual values traditionally associated with protected areas. To a large extent
protected landscapes have become the battleground where these philosophical debates have been played out.

The questions go beyond academic exercises into the realms of passionate and deeply held belief. I've seen the genuine anger and frustration in many conservation biologists at what they believe to be backsliding, obfuscation, and weak tactics during the middle of a biodiversity extinction crisis. And I have been in other protected area debates where "biodiversity" is almost regarded as a dirty word, associated with an authoritarian approach of pushing people aside in favor of wild nature, without thought for the cultural and social implications of these actions. Such division, in a global movement that is already struggling to retain a voice against a host of pressures, is profoundly dangerous.

### The role of protected landscapes

Unfortunately, divisions go further than just what people talk about in conferences. Different arms of government often regard protected landscapes as very different entities and management can end up confused as a result. Environment ministries tend to report them as contributing to biodiversity conservation targets, including those of the Convention on Biological Diversity's Program of Work on Protected Areas, while rural development ministries downplay their conservation role in favor of human livelihood issues. At management level, some protected landscape managers emphasize the nature conservation aspect and have addressed this carefully in management plans, while others see it as less important than maintaining landscape values, community benefits, and the traditional management systems. In fact, it was a British national park manager saying that, for him, biodiversity conservation was "irrelevant" (UK national parks are all IUCN category V) that originally lit the fuse for the Locke and Dearden polemic arguing for their delisting (Harvey Locke, pers. comm.).<sup>3</sup>

As categories V and VI grow in global importance, this confusion becomes dangerous. Category V now dominates European conservation efforts, at least in terms of area involved, with 52% of protected areas by area being so designated (Gambino 2008). If the protected landscape approach is not delivering biodiversity conservation, then many national biodiversity conservation strategies are in deep trouble. Evidence that this was the case would not destroy the importance of protected landscapes and seascapes, but it would change the way in which they are used and it might well mean that in some circumstances additional strictly protected areas (more "traditional" protected areas) would be required.

### Do protected landscapes deliver biodiversity conservation?

In fact, there is good if slightly limited evidence that the category V approach can deliver biodiversity conservation, *if* it is part of a genuine and coherent conservation strategy, carefully planned, negotiated, and managed over time. Data are lacking because there have been few comprehensive studies on the effectiveness of this or indeed any other protected area management strategy, something that IUCN WCPA seeks to remedy over the coming few years. But the limited evidence is encouraging. A detailed study in Catalonia, Spain (Mallarach 2008), found that protected landscapes provided habitat even for rare species like the bear, Iberian lynx, and wolf, and that the relatively large size of category V reserves made them more effective than small, strictly protected areas (which also had an important role for certain species). The protected landscape approach has been used successfully as the basis for species conservation strategies under the European Union's Natura 2000 network, particularly in the Mediterranean. Studies by the Royal Society for the Protection of Birds in the UK found that even in British category V protected areas, which tend to downplay biodiversity conservation, there were quantifiable benefits for wild species (Robins 2008). Evidence on the role of traditional farming methods in conservation exists in the Mediterranean region (Baldock 1995). Many individual projects link their success to a focused use of landscape approaches.

### A personal perspective

I have been closely observing the categories debate for a number of years, both as a member of the team that put together the Cardiff University study and as chair of the IUCN task force that coordinated the revision of the guidelines. For obvious reasons during that process I tried to keep a neutral position while the various debates were still going on; what follows are some more personal thoughts emerging from discussions over the past five years.

Protected areas are not just about biodiversity and an over-reliance on this single factor to "sell" protection is likely to fail in the long term. Broadening the support for protected areas is a critical challenge. Over the last few years I have been centrally involved in a series of projects, together with Sue Stolton and colleagues in WWF and the World Bank, looking at broader values of protected areas, including their role in producing clean drinking water, protecting agrobiodiversity, mitigating natural disasters, providing positive health benefits, reducing poverty, alleviating the impacts of climate change, and playing a role in the spiritual lives of faiths and religions.<sup>4</sup> Focusing entirely on biodiversity benefits is both inaccurate and risky, because it assumes that this single issue will be enough to persuade governments to commit huge areas of land and water for conservation. I also share frustration with a narrow biodiversity approach.

But at the same time we are in the middle of a genuine biodiversity crisis. There are many practical and ethical reasons to be profoundly concerned about the rapidly accelerating extinction rate caused by human actions. Whether or not a category V protected area really delivers biodiversity benefits usually depends on choices made by managers and other stakeholders. Given the strong and increasing emphasis on protected landscapes in many parts of the world, it would be a tragedy if these aspects of management were downplayed through lack of attention or interest, and I am also frustrated when I see what amounts to a reaction against biodiversity conservation by some managers. Climate change increases both the need and potential for an emphasis on wild nature in many category V reserves because the marginal farming systems that they support will become unviable, whereas natural systems can provide measurable environmental benefits (see, for instance, Phillips 2007). Prioritizing this in management approaches is both ethically and practically justified.

The new IUCN guidelines provide an important frame of reference for management of protected areas. Their ultimate success will depend in large part on managers recognizing

multiple benefits. This can mean a manager of a traditional category II national park including the needs of faith groups if a sacred natural site is present in the park; it can also mean a manager of a category V protected landscape increasing the emphasis on management for wild biodiversity. There will, for sure, continue to be arguments about some protected landscape approaches and whether or not they are giving enough space to wild nature. Getting the spirit of what we are doing right is more important than the minutiae of the wording in guidelines or treaties. Protected landscapes can offer huge benefits in terms of conservation of biodiversity in addition to their many other values, and it is important that those involved in their management recognize and support such approaches.

## Endnotes

- 1. The *UN List of Protected Areas* will remain the "official" global list of protected areas and should follow the IUCN guidelines, although it remains to be seen how strictly this will be applied.
- 2. Note that the criticisms tend to focus on both IUCN categories V (protected landscapes) and VI (protected areas with sustainable use) and many of the debates are similar. The current article focuses on protected landscapes because the center of the debate about the legitimacy of different protected area models has been in Europe, where category V is very common and category VI has been applied only to a very limited extent.
- 3. It should be noted that the UK does not refer to its category V protected areas in country reports to the Convention on Biological Diversity's Program of Work on Protected Areas, showing further signs that governments do not always speak with one voice as to their purpose.
- 4. Five book-length reports are available and can be downloaded from www.equilibriumresearch.com from the list of protected area publications: *Running Pure* on drinking water, *Beyond Belief* on faiths, *Food Stores* on agrobiodiversity, *Natural Security* on disaster mitigation, and *Safety Net* on poverty reduction. A report on links with health is underway and an overview book is planned for 2010.

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# Engaging Local Communities in Sea Turtle Conservation: Strategies from Nicaragua

# Richard Smith and Sarah Otterstrom

SEA TURTLES THROUGHOUT THE WORLD'S OCEANS ARE ENDANGERED, and species such as the leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelys imbricata*) turtles of the eastern Pacific are nearing extinction (Sarti-Martínez et al. 2007; Chaloupka et al. 2004). In response to this crisis, governments, communities, and non-governmental organizations (NGOs) are forming new partnerships to increase protection for sea turtles. Such alliances can provide valuable lessons for involving local communities in conservation.

This paper seeks to share the strategies and approaches applied by the organization Paso Pacífico to partner with local communities in sea turtle protection. Paso Pacífico is a non-profit organization founded in 2005, and is focused on restoring and protecting the endangered ecosystems along the Pacific slope of Central America. The program activities of our relatively young organization aim to conserve ecosystem processes operating at a landscape scale. Thus, we pair forest conservation efforts with complementary actions in the coastal and nearshore marine environments. Paso Pacifico currently focuses its conservation efforts on southewestern Nicaragua, where we are developing the Paso del Istmo Biological Corridor, a series of private protected areas connected through sustainably managed landscapes.

### Sea turtles in the Nicaraguan social context

Sea turtles are an important target for Paso Pacifico's conservation efforts. Four different species nest along Pacific beaches of southern Nicaragua: the olive Ridley (*Lepidochelys olivaceae*), hawksbill, leatherback, and Pacific green (*Chelonia mydas*). Despite its global importance as a locale for sea turtle reproduction, sea turtle nest poaching is widespread. At unprotected beaches, nearly 100% of nests located are lost. Local people and fishermen track the beaches at night for nesting turtles, and upon finding a nest, they immediately harvest all the eggs. Although there is variation among species, one sea turtle nest may provide up to ten dozen turtle eggs. Poachers sell captured sea turtle eggs to middlemen who take the eggs to urban centers where they are sold at public markets and restaurants throughout Nicaragua. Local people who initially sell the eggs receive US\$1.50–3.00 per dozen eggs.

The sea turtle egg trade in Nicaragua is influenced by the pervasiveness of rural poverty and the culture of turtle eggs as food. Nicaragua has the smallest economy in Latin America and the second lowest gross domestic product (IMF 2009). Poverty is most prevelant in rural areas, including along the coast (PNUD 2000). Local people turn to the sea turtle egg trade as a way to supplement their small cash incomes from subsistence farming and artisanal fishing. Nicaraguans have long consumed sea turtle eggs. It is believed that sea turtle eggs were an important food source for pre-Columbian settlements in coastal areas. During the Contra War of the 1980s, the scarcity of food and protein led to an increase in the sale and consumption of turtle eggs throughout the country (González-Pérez, pers. comm.). Today, Nicaraguan people express a preference for the flavor of sea turtle eggs and a belief that they have a superior nutritional value over chicken eggs.

# Community-based approaches

Paso Pacífico's community-based approaches are not entirely new in the conservation of sea turtles. Approaches that seek to maximize community involvement are common throughout the world, and include activities such as comanaged protected areas, community-guided ecotours, and community-led biological monitoring (refer to www.seaturtle.org for a global listing of projects). Critics point out that there has been very little rigorous testing of the effectiveness of community-based approaches, yet given the limited funding and the need for rural economic development throughout the tropics, many conservation organizations see community-based approaches as a possible win–win (Barrett et al. 2001). Recent research on community-based programs in Palau and other Pacific Islands demonstrate that these approaches can be effective, particularly when they have a bottom-up approach that is collaborative with NGOs and scientific institutions, and are adaptive to the local conditions (Johannes 2002; Risien and Tilt 2008). The Paso Pacífico program attempts to play the role of facilitator by which community members may step up and eventually lead the effort to protect their resources.

## **Project location**

La Flor Wildlife Refuge is a protected area located in southwestern Nicaragua. It was established to safeguard one of the region's most important *arribada* (mass nesting) beaches for the olive Ridley sea turtle. Rangers from MARENA, Nicaragua's Ministry of Environment, patrol the beach at La Flor, with support from the Nicaraguan army. Similar to most other protected areas in Nicaragua, the terrestrial area of the reserve is under private ownership, while the core area is administered by MARENA. Protective activities and patrols by the MARENA park rangers are limited to a single beach where the olive Ridley *arribadas* ocur. According to MARENA, limited funding and a low number of personnel make it impossible to patrol beaches beyond the La Flor *arribada* beach. Although the olive Ridley is the primary species nesting at La Flor, critically endangered hawksbill, leatherback, and Pacific green turtles nests solitarily along the isolated southern beaches at La Flor (Figure 1).

The Paso Pacífico turtle conservation program is located at two remote beaches within La Flor Wildlife Refuge. The program is carried out in partnership with community members from La Tortuga and Ostional, which are settlements of the San Juan del Sur Munici-



**Figure 1** Location map for La Flor Wildlife Refuge and communities of La Tortuga and Ostional, San Juan del Sur, Rivas Province, Nicaragua. Community rangers protect sea turtles at beaches located between Punta La Flor and Punta Arranca Barba. The La Flor *arribada* beach is protected by MARENA government rangers.

pality in the Rivas Province of Nicaragua. While the beaches involved in this project are part of La Flor Wildlife Refuge, they are not sites of olive Ridley *arribada* nesting events, nor do they receive protection from government rangers. The beaches protected through this community-based program are located between Punta La Flor and Punta Arranca Barba, near the Ostional community (Figure 1).

It is important to note that southwestern Nicaragua is undergoing economic change due to a growing tourism industry and investment in coastal properties for hotel and housing developments. This pressure extends to properties near Ostional and La Flor Wildlife Refuge. The potential for an increase in tourism represents a threat to, and an opportunity for, both local communities and the improved management of endangered sea turtles.

### **Project goals**

The long-term goal of the Paso Pacífico sea turtle conservation program is to protect endangered sea turtles in partnership with local communities. The specific objectives are to (1) reduce conflict between communities and natural resource managers near La Flor Wildlife Refuge, (2) decrease poaching and increase protection for solitary nesting sea turtles, and

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(3) promote alternative sources of income that are tied to conservation for the benefit of local people.

In late 2006, Paso Pacífico first set out to identify the threats and problems affecting sea turtle conservaton near La Flor Wildlife Refuge. Paso Pacífico staff carried out a series of semi-structured interviews with over fifty community members from La Tortuga and Ostional communities. These interviews were done with adult farmers, fishermen, and women, and included questions regarding the perceived threats to sea turtles, the value of coastal conservation, and the level of interest in tourism. In addition to the one-on-one interviews, Paso Pacífico held two community-wide meetings where a list of obstacles to sea turtle conservation were developed by community members and a discussion of their root causes ensued. One of the major results of this diagnostic study was the finding that local communities are interested in supporting sea turtle conservation and see the potential for tourism. Community members expressed anger at not being trusted to protect sea turtles and also a feeling of resentment that they are being excluded from the economic benefits they believe come from tourism at La Flor Wildlife Refuge. They view the turtle poaching problem as one carried out by a small minority of community members who are in economic need or who are considered unwilling to participate in more labor-intensive agriculture and fishing.

### Strategies

Paso Pacífico developed a series of strategies to respond to the needs identified by the local communities (Table 1). We provide a description of each of the strategies being employed. The programs here have been supported through funding from the USAID (US Agency for International Development) project Sustainable Tourism in Critical Watersheds, the US Forest Service International Institute for Tropical Forestry, Project AWARE Foundation, the State of the World's Sea Turtles Project, the Turner Foundation, private donors, and an anonymous foundation.

**Mediate conflict** There is a substantial history of turtle egg poaching in the communities surrounding La Flor Wildlife Refuge and adjacent beaches. Turtle eggs removed from local beaches are not primarily consumed within the local community, but are sold to middlemen who bring the eggs to larger markets. The sale of turtle eggs represents a valued revenue stream in the Ostional and La Tortuga communities, particularly during the rainy season (June through November) when artisanal fisheries are down. Local people are prohibited by MARENA officials from entering La Flor Wildlife Refuge, and thus are denied access to harvest eggs on the main La Flor *arribada* beach. This has created resentment within the community because local people believe that the rangers and army are finding ways to enrich themselves—for example, by collecting entrance fees at the park. Local people feel that they are excluded from the benefits of tourism. Also, a considerable amount of tension is created because soldiers from the Nicaraguan army who support MARENA rangers are armed with guns. In the past, the guns have been fired by the army against poachers from local communities, and there have been serious injuries.

Problem/Need	Strategies
Community in conflict surrounding turtle conservation, particularly with government resource managers at La Flor	Mediating conflicts and establishing new partnerships and alliances with community groups and leaders
Zero protection of nesting turtles; lack of scientific data on populations of sea turtles	Training and equipping local people to protect beaches, using science-based methods to monitor nesting beaches and turtles
Pervasive rural poverty ( illegal turtle egg market is source of cash income to local people)	Provide performance-based incentives for sea turtle conservation, spread economic benefits throughout community
Growing tourism industry; local communities marginalized from tourism benefits	Prepare community memberse to receive tourists, support establishing community- based tourism micro-businesses

 Table 1
 Outline of problems and needs identified by community members and the strategies developed by Paso Pacífico to respond.

In 2007, Paso Pacífico hired an expert in conflict mediation who held interviews and one-on-one meetings with community leaders and governmental agencies (the municipality, MARENA, army, and local police). These meetings were followed by a series of community workshops, resulting in an agreed-upon framework for cooperating in the name of conservation and sustainable tourism development. Paso Pacífico also held activities throughout the year to increase trust and cooperation among stakeholders. These efforts included meetings with tourism investors and developers, a workshop with developers promoting turtle-friendly lighting, a field trip with local schoolchildren to La Flor Wildlife Refuge to view nesting sea turtles, and a sea turtle educational exhibit at a local school. These activities were designed to raise community awareness regarding the importance of sea turtles while also opening the dialogue between the different stakeholders who have been at conflict.

**Monitor and protect solitary nesting turtles** In early 2008, Paso Pacífico held a community meeting in La Tortuga and Ostional. There, we presented our goals for sea turtle conservation and our interest in seeing the local communities directly benefit from ecotourism. We announced a request for applications in February 2008 to fill community ranger positions. There were over ten applicants, and community leaders together with Paso Pacífico staff formed a committee to review the applications. Six rangers were hired at a competitive wage with benefits to work as full-time rangers to protect the beach. This was the first time any of these men had formal employment and four of them were formerly turtle egg poachers.

In March 2008, the lead author (a Paso Pacífico Board member and retired US National Park Service ranger) visited the newly hired rangers to teach an intensive course. The workshop focused on the roles and responsibilities of a ranger and the global network of rangers creating "the thin green" line to protect thousands of endangered animals and places. Government rangers from the MARENA station at La Flor Wildlife Reserve and members of the Nicaraguan army also participated in the course. Rangers received biological monitoring training from conservation scientist Cynthia Lageaux of the Wildlife Conservation Society, and two rangers were able to travel to Lageaux's project site on Nicaragua's Caribbean coast to practice methods of tagging turtles. (Rangers can successfully excavate nests to count hatchling success, transfer nests that are poorly located, and record nesting behavior of four turtle species.) Training has continued and other workshops have included an international protected areas management course conducted by the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), a first aid course, and training in ranger preparedness and visitor services. Rangers have been equipped with radios and professional outdoor equipment, including new uniforms. Rangers will also soon benefit from portable solar electric lights engineered by a team of American architects at the Portable Light Project. The lights are adapted to provide the red light conditions required for monitoring turtles.

Paso Pacifico community rangers work round the clock protecting two pristine and isolated beaches (Figure 2). Rangers are trained to use non-confrontational approaches to ask that egg poachers cease poaching on the beaches, and thus far this approach has been successful. This may be because rangers are all known friends and relatives of local poachers. The community rangers play a central role in protecting extremely rare sea turtle species, including the hawksbill, leatherback, and Pacific green. Over the past year we have found that these beaches are particularly important nesting sites for Pacific green sea turtles (we have protected over 40 nests in the past six months, while there were fewer than 10 nests reported for all of western Nicaragua in 2007). These beaches also have the highest counts of nesting hawksbills reported for the Pacific of Nicaragua. The presence of hawksbill and leatherback nests is particularly noteworthy given the critical status of these species. Without the protective actions of community rangers, it is certain that nests at these beaches would be poached.

Rangers express great satisfaction in applying their knowledge about nesting behavior to now protect these animals rather than harm them. The rangers see that by participating in conservation they can provide a steady income for their families and can assume positions of leadership within their communities. The strategy of hiring former poachers has been particularly important in protecting turtles, because those who at one time worked as poachers are truly experts on sea turtles and their nesting behavior.

**Performance-based incentives for conservation** It is believed that economic need in the communities drives much of the turtle egg poaching activity. Thus, any attempt to reduce poaching must also include an effort to address the root problem. In recent years, conservation programs throughout the world have had success using direct payments to reward local people for their participation in sea turtle conservation. Performance-based incentives are being applied to sea turtle conservation programs in Kenya, Tanzania, Madagascar, and Suriname (Ferraro and Gjertsen 2009).

The Paso Pacífico program allows for incentive payments, benefiting both local people and the general community. First, individuals receive a nominal payment upon committing to protect a nest (US\$10-\$20 per nest). Then, when turtle eggs are successfully hatched and



**Figure 2** Aerial view of beaches protected through Paso Pacífico community-based programs. Photo courtesy of USAID/Jorge Paniagua.

verified by Paso Pacífico rangers and a community committee, both the "protector" and the community fund receive a second and larger payment of US\$0.10–0.30 per hatchling. The payment varies by species, with the more endangered hawksbill and leatherback turtles returning the highest amounts. The community fund accumulates throughout the year, and at the end of the year the community's leadership decides how to use the money. The performance-based payments program is also providing incentives to the Paso Pacífico rangers by awarding them a bonus payment for every nest that they successfully monitor. This payment is given at the end of the year. Also, a bonus award is made to the ranger who has protected the most nests during the year (Figure 3). Awards are given to the rangers in a public forum in front of the entire community.

When this program was being designed, Paso Pacifico held community meetings to discuss it and to form a community committee to oversee its transparency. Additionally, Paso Pacífico's country director, Liza González, spent one month in the United States as a Kinship Conservation Fellow where she worked with recognized conservationists and environmental economists to refine the project design and ensure that incentive payments are based on appropriate cost-benefit modeling. Over 25 nests have been protected through this program. We expect that the level of community participation will increase during 2009, the second year of the program.

The sustainability of the turtle payment program will be an important challenge to Paso Pacífico in the coming years as the program expands to new beaches and participation increases. Despite questions of sustainability, performance-based incentive payment programs can be an extremely cost-effective and successful method to protect sea turtles (Ferraro and Gjertsen 2009). To address the challenge of sustainability, Paso Pacifico is developing a Figure 3 Community ranger Felix Reyes receives an award for the most sea turtles protected in Year One. Photo courtesy of Paso Pacífico.

"sponsor a sea turtle program" where an optional donation to the sea turtle conservation program is added to the bill at major hotels in the San Juan del Sur area. We are also promoting the sale and use of sea turtle shower timers, to reduce water consumption in the local hotel industry.

**Community-based tourism** Paso Pacífico held guide training courses for 32 community members over two months in order to introduce them to concepts in natural history tours, use of the English language, and coastal ecosystems. Of these



trainees, 15 were selected for their commitment to guiding skills and invited to participate in two intensive courses taught by ecotourism experts from the Mesoamerican Ecotourism Alliance (MEA). Guides are now receiving tourists, and during the summer of 2009 three additional courses will be given to guides. MEA has begun internationally marketing these tours.

Ecotourism has long been touted as an approach to convince local people that conservation can be a sustainable revenue stream for local communities. In some cases, it has; in many, it has not. Paso Pacífico in-country professionals will have to carefully monitor the impacts of tourism on the community, both positive and negative, and whether any increase in tourism increases support for conservation. Paso Pacífico expects that tour operators and international visitors will recognize the expertise and enthusiasm of our young community guides. We expect that tour groups hoping to view turtles or coastal dry forests will rely on the community guides for tour packaging and delivery.

## Principles for community participation

Community participation is at the core of Paso Pacífico's values as an organization. In guiding our sea turtle conservation program, we rely on three important principles to ensure that our programs have a measurable and positive impact: (1) program evaluation and adaptive management, (2) assignment of leadership roles to local community members, and (3) program transparency for local communities.

## Program evaluation and adaptive management

Paso Pacífico is committed to adaptive management. For example, the performance-based incentive program must be carefully monitored to assure that it is producing the desired results. If it does not, the Paso Pacífico staff must work, under the guidance of the board of

directors, to change the program or develop a new system for responding to the economic pressure to exploit sea turtle eggs. Program monitoring, evaluation, and adaptation are ongoing processes. We have adopted the following model for employing this management technique:

**Testing assumptions** is about systematically trying different actions to achieve a desired outcome. It is not, however, a random trial-and-error process. Instead, it involves considering the conditions at the project site, developing a specific set of assumptions about what is occurring, and identifying which specific actions that might be used to affect these events. Actions are then implemented and results monitored to see how they compare with the ones predicted by the assumptions.

In the case of the Paso Pacífico project, we have operated under the assumption that community members would be quick to join the incentive payments program. After Year One of the program, we learned that it had not gained widespread acceptance because community members did not believe that they would actually receive the payments promised. Paso Pacífico made a false assumption in believing that community members would trust that we would follow through with our program. In response to this new situation, we have carried out a series of meetings to better explain the program and have highlighted the gains made by community members who have earned extra income through incentives.

**Adaptation** is about taking action to improve the project based on the results of monitoring. If the project's actions did not achieve the expected results, it is because the assumptions were wrong, the actions were poorly executed, the conditions at the project site have changed, the monitoring was faulty, or some combination of these problems. Adaptation involves changing assumptions and interventions to respond to new information obtained through monitoring.

Paso Pacífico's program is monitoring two important variables to determine the effectiveness of our programs. First, we are monitoring the number of nests destroyed by poaching, and second, we are monitoring the number of actual nests. During Year One, there was one beach that we set out to protect which had a relatively small number of sea turtles nesting. For Year Two, we determined that our conservation efforts would be more effective at another beach where the community rangers say there is a greater number of nesting sea turtles. While this is a simple adaptation to our program, we believe that it will markedly increase the number of sea turtle nests protected.

*Learning* is about systematically documenting the process that the project team has gone through and the results achieved. This documentation will help the team avoid making the same mistakes in the future. Other practitioners are eager to learn from successes and failures so that they can design and better manage projects. By sharing the information learned from the project, as in this paper, Paso Pacífico may help conservation efforts around the world. Paso Pacífico is collaborating with scientists and managers to document the lessons that are emerging from this program. Our project was recently highlighted in a global overview of incentive payment programs being used for sea turtle conservation (Ferraro and Gjertsen 2009). Additionally, we are sharing our experiences within Nicaragua at important in-country meetings, such as at the Nicaraguan Sea Turtle Network annual conference.

## Including local communities and stakeholders

Traditional conservation projects around the world have long been marked by a failure to involve local communities in the planning and decision-making processes. At one time, public participation consisted of program managers merely telling local people in a series of public meetings what was going to happen. This one-way communication was viewed as sufficient to meet the mandate for public involvement. Paso Pacífico seeks to involve its local partners in every step of the project. This is the principal reason that we began our project with conflict mediation and why we selected our community rangers in a very transparent selection process. Community leaders helped us interview and select the candidates. This has produced a high level of trust between Paso Pacífico's Nicaraguan staff and their fellow citizens.

### **Program transparency**

Paso Pacífico has adopted transparency as one of our core operating principles and values. We apply this principle to reporting the results of our activities—failures as well as successes—to our stakeholders. These include our partners, donors, and colleagues in the local communities, and to the Nicaraguan government. We believe this is critical to maintaining the high level of confidence that local people now have in our efforts to protect sea turtles. The payment for conservation program has been very transparent and open to community involvement. For example, in March 2009 Paso Pacífico held a community event where we reported the payments made through the incentive program and the number of nests protect-ed, and made a public payment to the community fund.

### Next steps

We have been somewhat disappointed at the lack of community participation in the incentive payment program, as only twelve nests are currently enrolled in the program. Rumors have reached us that egg poachers in the community are discouraging people from participating. We plan to step up our efforts to find community volunteers through the use of public meetings conducted by our rangers. Since the rangers are from the communities where the poachers live, they represent a new, sustainable way of dealing with turtle nesting. Our environmental education programs will include hands-on activities and lessons in the local schools on a monthly basis. We recognize that children can exert pressure on their parents to become more responsible stewards of the environment.

Paso Pacífico is constantly seeking additional training for our community rangers. This training takes two forms: *technical training*, so that they improve their ability to monitor and document nesting activity on the beaches and expand their knowledge of the life cycles of the various nesting species; and *professional training*, so that they can improve their ranger skills. These skills include making visitor contacts, dealing with poachers, assisting community guides, and coordinating activities with the other entities that protect marine turtles. In addition, Paso Pacífico is supporting two of our rangers in applying for a scholarship to

attend a protected areas management course to be held in Argentina in the fall of 2009.

In situ conservation depends on the support and involvement of local communities. By giving local communities a lead role in turtle protection, Paso Pacífico attempts to ensure that our activities contribute towards good-will and cooperation among stakeholders. Direct economic benefits through ranger wages and conservation incentive payments will also benefit local communities by alleviating poverty. The strategies we employ also produce other benefits, including increased educational opportunities for community members, greater community cooperation, and a sense of local pride in the natural resources surrounding the community.

### Epilogue (by Richard Smith)

I was in Nicaragua in late June of this year working with the community rangers who are employees of the NGO Paso Pacífico, and during that time a rare thing occurred. Two hawksbill turtles came ashore to nest on the beach that the rangers patrol. This is one of the most critically endangered of the marine sea turtles. Very few records exist of hawksbill nesting on the western beaches of Central America. Moreover, scientists know little about their migration patterns or population numbers. The rangers kept the two turtles on the beach for two days. (It is possible to keep the turtles for up to three days if a wet towel is kept on their heads and water is poured over their backs.) During the second day, a turtle expert from a regional program known as Project Hawksbill came and, in cooperation with Paso Pacífico and the employees of MARENA, installed a digital transmitter on the shells of the turtles so that their movements at sea can be tracked by satellites when they come to the surface to breath. This was a big deal. Children were released from school to observe the installation. Officials from MARENA were there, as were representatives of the media. Everyone recognized that the real heroes of this event were the rangers who work for Paso Pacífico.

It was very emotional when the children applauded when the second turtle returned to the sea after being liberated. I am sure none of them will become turtle egg poachers in the future.

You can track the movements of these two turtles on-line (www.seaturtle.org/tracking/?project\_id=295&dyn=1246546646). On the left hand side of the page, you will find our two turtles, Karen and Brasilia. (The children named the second turtle Brasilia.) Click on the names of the turtles to see their movements. Brasilia had laid her eggs before the rangers nabbed her. Karen had not. It is likely that she will return to the same beach to lay her eggs.

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# Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context

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Ed. note: With the increasing recognition of the value of nature to human health and wellbeing, Parks Victoria will host the first International Healthy Parks Healthy People Congress in 2010. The aim of the congress is to raise awareness of recent research, highlight case studies, and facilitate discussion regarding the advantages of, and opportunities for, future collaboration. The congress will be staged in Melbourne, Australia, 11–16 April 2010. See healthyparkshealthypeoplecongress.org for further details.

This paper is an abridgment, made with the authors' permission, of a much longer monograph, "Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context—A Review of Relevant Literature (2nd ed., March 2008). The original monograph in its entirety can be found at the congress website, above. This version focuses on the sections of the monograph most directly related to parks.

### Introduction

THAT THE NATURAL ENVIRONMENT IS A KEY DETERMINANT OF HEALTH IS UNQUESTIONED. A report published by the World Health Organization (Prüss-Üstün and Corvalán 2006:6) claims that "approximately one-quarter of the global disease burden, and more than one-third of the burden among children, is due to modifiable environmental factors." However, even in its attempt to quantify the environmental burden of disease, WHO has focused on *environmental degradation*—"the amount of death and disease caused by factors such as unsafe drinking-water and sanitation, and indoor and outdoor air pollution" (Prüss-Üstün and Corvalán 2006: 6), paying little if any attention to the impacts of *environmental deprivation*. The same focus is reflected more broadly within "environmental health" as a discipline and a profession.

Despite the prevailing attitude in society that humans are separate from, outside of, or above nature (Suzuki 1990; Martin 1996), as human understanding of the natural environment has developed, and the massive destruction that human activities can have on natural systems has been observed, a more enlightened view has emerged. This view recognizes that plants and animals (including humans) do not exist as independent entities as was once thought, but instead are parts of complex and interconnected ecosystems on which they are entirely dependent, and of which they are fundamentally a part (Driver et al. 1996). In the foreword to its Millennium Ecosystem Assessment report "Ecosystems and Human Wellbeing: Health Synthesis," the World Health Organization (2005:iii) stated:

Nature's goods and services are the ultimate foundations of life and health, even though in modern societies this fundamental dependency may be indirect, displaced in space and time, and therefore poorly recognised.

The human relationship with the natural world is deeply intertwined with the human conscious and subconscious mind and is therefore not easy to access for analysis. Nonetheless, in recent years, there have been concerted attempts, particularly in the disciplines of ecology, biology, environmental psychology, and psychiatry, to empirically examine the human relationship with the natural world.

Many researchers have come to the conclusion that humans are dependent on nature not only for material needs (food, water, shelter, etc) but perhaps more importantly for psychological, emotional, and spiritual needs (Wilson 1984; Katcher and Beck 1987; Friedmann and Thomas 1995; Roszak et al. 1995; Frumkin 2001; Wilson 2001). Just how dependent on nature humans are, and exactly what benefits can be gained from interacting with nature, are issues that have only just begun to be investigated. Findings so far, however, indicate that parks and other natural environments play a vital role in human health and wellbeing through providing access to nature. This is likely to change the way parks and nature are currently viewed and managed by governments and the wider community.

The idea that contact with nature is good for human health and well-being is the subject of research in diverse disciplines such as environmental psychology, environmental health, psychiatry, biology, ecology, landscape preferences, horticulture, leisure and recreation, wilderness, and of course public health policy and medicine. Driving these divergent streams is the central notion that contact with nature is beneficial, perhaps even essential, to human health and well-being. While the strength of the evidence for this assertion varies, due in part to "methodological limitations of [some of] the research," and the mechanisms by which nature influences health outcomes is generally unknown, nevertheless acceptance of the association of nature with human well-being is increasing (Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and Environment 2005:81).

In the last few hundred years, however, there has been an extraordinary disengagement of humans from the natural environment (Katcher and Beck 1987; Axelrod and Suedfeld 1995; Beck and Katcher 1996). This is mostly due to the enormous shift of people away from rural areas into cities (Katcher and Beck 1987). Here, contact with nature is often only available via parks. Never have humans spent so little time in physical contact with animals and plants, and the consequences are unknown (Katcher and Beck 1987). Further to this, modern society, by its very essence, insulates people from outdoor environmental stimuli (Stilgoe 2001) and regular contact with nature (Katcher and Beck 1987). Some researchers believe that too much artificial stimulation and an existence spent in purely human environments may cause exhaustion, or produce a loss of vitality and health (Katcher and Beck 1987; Stilgoe 2001). A subject that has attracted some concern is the lack of opportunities for nurturing in urban environments. Nurturing living organisms, such as animals and plants, could be an essential part of human development that, if denied, could have adverse effects on the health, and perhaps even the long-term survival, of the human species (Katcher and Beck 1987; Lewis 1992; Wilson 1993; Bustad 1996; Kellert 1997). Katcher and Beck (1987) state that there is a critical need for continued exploration of the emotional and health value of nurturing living things; they believe it will reveal a human health requirement equal in importance to exercise and touch.

The idea that isolation from the natural world may be harmful to health is not limited to scientists and researchers but is also seen in the choices of everyday people. For example, it is estimated that 42% of the American public uses some form of complementary medicine (Clark 2000), and worldwide the use of complementary medicine has doubled in recent decades (New Scientist 2001). A recent Australian review of the literature on the use of complementary and alternative medicines, with a particular focus on their use in treating asthma, found that "20–30% of adults and 50–60% of children with asthma may be using CAM at any one time" (Slader et al. 2006:386). The rise in popularity of complementary medicines may not only be due to disenchantment with modern techniques, but also the expression of a desire to take a more natural approach to health (Clark 2000). In fact, many patients cite "naturalness" as the appeal of complementary medicine, yet others are drawn by spiritualism or the emphasis on holism (New Scientist 2001). Both of these qualities are often assigned to nature. Yet, there is still a lack of understanding in the general populace, governments, and institutions about the significance of the human connectedness with nature, and its relevance to current social problems, particularly in terms of health.

The following is a review of the potential and actual health benefits of contact with nature. Although the primary interest of this review concerns human contact with nature in a park context, we have examined the literature within the broader context of human health and nature. This has meant the inclusion of fields such as environmental psychology, psychology, psychiatry, medicine, environmental economics, biodiversity conservation, ecology, complementary and alternative medicine, landscape design and urban planning, recreation and leisure, environmental health, public health policy and health promotion, adventure and wilderness therapy, and religion and spirituality.

The emphasis on parks in this document is for the simple reason that they are the chief means of maintaining intact natural ecosystems and preserving biodiversity in a world that is becoming increasingly urbanized. Because of this, parks play an essential role in public health, as they are the most readily available (or sometimes the only) source of nature for the majority of people who live in urban areas. This review is the first step toward collating current knowledge on this topic with the aim of undertaking further empirical research in the near future.

## Parks, nature, and health: What is the connection? The context: Parks and people

When parks were first designed in the nineteenth century, city officials had a strong belief in

the possible health advantages that would result from open space (Hamilton-Smith and Mercer 1991; Rohde and Kendle 1997). It was hoped that parks would reduce disease, crime, and social unrest, as well as providing "green lungs" for the city and areas for recreation (Rohde and Kendle 1997). At this time, it was also believed that exposure to nature fostered psychological well-being, reduced the stresses associated with urban living, and promoted physical health (Ulrich 1993). These assumptions were used as justification for providing parks and other natural areas in cities, and preserving wilderness areas outside of cities for public use (Parsons 1991; Ulrich 1993).

Although parks have not entirely lost their connection with health, the modern emphasis is almost exclusively on their use as a venue for leisure and sport (Rohde and Kendle 1997). The importance of physical activity for health is well known, yet physical inactivity contributes significantly to the burden of disease and is on the rise in developed countries (Duncan et al. 2005). A wealth of literature exists, linking parks with varying levels and types of physical activity. For example, Wendel-Vos et al. (2004) used GIS databases to objectively measure the amount of green and recreational space in neighborhoods, and found that there was an association between greater amounts of parks and sports grounds in an area and increased levels of cycling. Similarly, a study by Zlot and Schmid (2005) found that there was a significant correlation between parkland acreage and walking and cycling for transportation. However, other research has shown that it is not only the size but the quality of parkland and public open space (e.g., Giles-Corti et al. 2005), as well as its physical and economic accessibility (e.g., Bengoechea et al. 2005), that influences people's use of such areas. As Lee et al. (2005) note: "Merely building a park in a deprived area may be insufficient for insuring its intended use.... It is critical to provide ongoing support for maintenance and civic improvements." Exploring the role of personal, social and environmental attributes as mediating factors in socioeconomic variations in women's walking behaviors, Ball et al. (2006) found that while all three elements play a part, access to environments conducive to walking is a key factor which needs to be taken into account. Two aspects of parks and open spaces which influence their use are perceptions of safety and aesthetic appeal (Evenson et al. 2006).

Aside from this recent focus on parks as venues for physical activity, parks tend to be viewed as optional amenities rather than as necessary components of urban (as well as rural) infrastructure (Kaplan and Kaplan 1989). Moreover, there is a prevailing lack of awareness about opportunities for enhancing health provided by larger, wilderness parks such as national parks. Why the benefits of parks understood by early landscape designers and park engineers have been overlooked is a mystery. Yet, research on the benefits of nature carried out over the last two decades is indicating that in fact, they may have been right. Amongst other evidence, data so far have shown that "green nature" can reduce crime (Kuo 2001), foster psychological well-being (Kaplan and Kaplan 1989; R. Kaplan 1992), reduce stress (Parsons 1991; Ulrich et al. 1991b), boost immunity (Rohde and Kendle 1994; Parsons et al. 1998) enhance productivity (Tennessen and Cimprich 1995), and promote healing in psychiatric and other patients (Katcher and Beck 1983; Beck et al. 1986), and is most likely essential for human development and long-term health and well-being (Driver et al. 1996).

Despite the prevailing emphasis on sport and leisure, park management agencies have recently focused on the social and environmental values of parks. For example, the Canadian Parks/Recreation Association recently published *The Benefits Catalogue* (1997) documenting the health and well-being benefits of all aspects of recreation, including that carried out in parks. In Australia, the recent repositioning of Parks Victoria's key message to "Healthy Parks, Healthy People" acknowledges the symbiotic relationship between parks and people (de Kievit 2001). However, although the government and much of the community are aware of how people can benefit parks (e.g., by legislation, activism, or friends of parks groups), the benefits that parks can bestow on people (in terms of health and well-being) through contact with nature have, until recently, gone largely unrecognized.

As summarized in this review, the evidence from recent research demonstrates clearly that there are many and varied health effects to be derived from contact with nature, and that, in urban environments in particular, experiencing nature through parks may in fact be a vital component of human health that for too long has been ignored.

### Parks, public health, and well-being

The ecosystem is the fundamental capital on which all life is dependent (Suzuki 1990). Because our water quality, air quality, economic vitality, and personal well-being are as dependent on natural resources as they are on transportation, communications, and public safety systems, parks, by providing access to nature and protecting ecosystems, are an essential part of the infrastructure of our cities and communities (Gutowski 1994, cited in Lewis 1996). The threat of climate change has heightened awareness of the ecosystem services provided by parks and other green spaces. Yet, despite a growth in conservation activities over recent years, there still appears to be a lack of acknowledgement and acceptance on the part of planners, decision-makers, and developers of the need for "a healthy and diverse natural environment in the modern city" (Kellert 2004:9).

In addition to their contribution to public health and well-being through ecosystem services, parks also contribute to health and well-being through the provision of settings for community engagement. Baum (1999) states that healthy communities should provide varied opportunities for their citizens to meet and interact in both formal and informal settings. Recent research has shown that parks make a key contribution to meeting this requirement (e.g., Krenichyn 2005). However, it has been asserted that, if not well-maintained and -used, parks which form boundaries between neighborhoods of different cultural, ethnic, and socioeconomic characteristics may become "green walls" dividing communities, rather than places of community interaction (Solecki and Welch 1995).

In the urban environment, the best access that people have to nature (apart from that available in their homes and gardens) is via parkland. Parks vary in size, shape, quality, and character, and hence satisfy the whole spectrum of opportunities for contact with the natural world at various levels. Yet, Wilson's (1984) biophilia hypothesis has prompted many researchers to re-evaluate their understanding that plants and engineered ecosystems, such as parks, please people only on a cultural (Stilgoe 2001) or superficial level (Driver et al. 1996). From an evolutionary perspective, parks are ideal environments in which to reap some of the positive contributions to personal health that are inseparable from our evolutionary history, but which are virtually impossible to obtain in modern society (Furnass 1979). These contributions include the physiological and psychological benefits derived from physical activity over varied terrain, the dramatic change in sensory input, and the spiritual values which can accrue from direct contact with the natural world (Furnass 1979). A common conclusion in the literature is that humans may not be fully adapted to an urban existence (Glendinning 1995; Kellert and Wilson 1993; Kellert 1997; Burns 1998). Hence, they live in an environment so different to that from which they evolved that natural selection has not had time to revise human bodies for coping with many aspects of modern life, including fatty diets, vehicles, drugs, artificial lights, and central heating (Nesse and Williams 1996, cited in Burns 1998). The reasoning for this argument is that humans have spent many thousands of years adapting to natural environments, yet have only inhabited urban ones for relatively few generations (Glendinning 1995; Roszak et al. 1995; Suzuki 1997; Gullone 2000). Moreover, although humans may have all of their physical needs well satisfied by the urban environment of large cities, our internal psyche is profoundly disturbed (Suzuki 1997; Gullone 2000).

Frederick Law Olmsted, the 19th-century American landscape architect, believed in the restorative quality of green nature that "operates by unconscious processes to relax and relieve tensions created by the artificial surroundings of urban life" (Lewis 1992). Olmsted (cited in Lewis 1996) also believed that parks improved health and vigor and extended the life expectancy of citizens. These ideas are now being confirmed by research in psychology and geography, as well as in many other fields. Examples of how parks and nature can contribute to some of the components of health are displayed in Table 1. Although the physical, mental, and social components of health have been identified by health authorities, such as the Victorian Health Promotion Foundation (VicHealth 1999), this review advocates an ecological definition of health by also including the spiritual and environmental components.

Parks and nature have enormous untapped health potential as they provide an opportunity for people to re-establish and maintain their health in a holistic manner. Recent developments in public health and health promotion have recognized the benefits of a holistic approach. For example, it has been stated that the major determinants of health have little to do with the health care system (Hancock 1999), and that public health needs to focus on the environmental and social aspects of health (Chu and Simpson 1994). Parks are in an ideal position to address both these, and other aspects, of human health and well-being.

### **Repositioning parks**

Parks and nature are currently undervalued as a means of improving and maintaining health. Although most people are aware of the health benefits of sport and recreation, the range of other health and well-being benefits arising from contact with nature are virtually unknown. Although further research is required, the findings summarized in this report are sufficient to warrant the repositioning of parks in the minds of both the community and government

Component of health	Contribution of parks
Physical	Provide a variety of settings and infrastructure for various levels of formal and
	informal sport and recreation, for all skill levels and abilities, e.g., picnicking, walking, dog training, running, cycling, ball games, sailing, surfing, photography, bioductobing, buoburghing, coch alimbian, compiler,
March 1	M.L. Strowatching, bushwatking, rock chinding, camping
Mental	artistic inspiration and expression; educational development (e.g., natural and cultural history)
Spiritual	Preserve the natural environment for contemplation, reflection, and
39 BC 12	inspiration; invoke a sense of place; facilitate feeling a connection to something beyond human concerns
Social	Provide settings for people to enhance their social networks and personal
	relationships from couples and families, to social clubs and organizations of all sizes, from casual picnicking to events days and festivals
Environmental	Preserve ecosystems and biodiversity, provide clean air and water, maintain ecosystem function, and foster human involvement in the natural environment
	(friends of parks groups, etc.)

 Table 1
 A summary of the contribution of parks to human health and well-being.

as a positive health resource. Parks need recognition for the essential role they play in preserving, maintaining, and promoting the health of humans, as well as that of their environment.

Parks, in fact, are an ideal catalyst for the integration of environment, society, and health (which have been demonstrated to be inextricably linked) by promoting an ecological approach to human health and well-being based on contact with nature. The potential exists for parks to gain an expanded role, scope, and influence in society, especially in terms of public health, as well as changing the way park management bodies relate to other organizations and agencies (by advocating an integrated approach to government). This would also bring together several disciplines and/or agencies already moving in this direction as well as valueadd to the status of parks in the community.

In order to reposition parks, it is necessary for park management agencies to:

1. Communicate to governments and the wider community that:

- A growing body of evidence shows that access to, and interaction with, nature is essential to human health and well-being;
- Through providing access to nature, parks improve and maintain human health and well-being (both at an individual and community level);
- By improving and maintaining human health and well-being, parks have the potential to reduce the burden on the health care system;
- Parks facilitate an holistic/ecological approach to health and well-being that is beneficial (and essential) to individuals, society, and the environment;
- Through providing a holistic/ecological approach to health, parks reinstate people with a sense of empowerment and control over their own health and well-being.

## 2. Educate governments and the wider community:

- As to how the above can be applied for improved health and well-being;
- About how to incorporate this knowledge into public health policy and health promotion;
- About how to collaborate in the pursuit of common goals;
- About the need for broadening the knowledge base in this area (via further research) for future dissemination.

3. *Facilitate* the engagement of the community with nature in order to re-establish the importance of nature in people's lives and the cultivation of a holistic and sustainable attitude towards life and health:

- By communication and education as outlined above;
- By continued exploration of the benefits to individuals and communities to be gained from contact with, and preservation of, nature;
- By fostering park management practices which support community engagement with nature.

To accomplish the above will require the cooperation of multiple government departments and/or other agencies (i.e., those whose portfolios/core business relate to any aspect of society, health, or the environment). This in itself would be ground-breaking since traditionally (as is commonly known) government departments (and other similar entities such as university faculties or research institutes) tend to work in isolation, despite opportunities that may exist for mutual benefit. An interdisciplinary approach would reflect a recent insight in health promotion that modern health issues are usually multifaceted and complex, arising from social and environmental conditions of the individual or community concerned (e.g., socioeconomic status, access to basic health and educational services, family issues, social cohesion, and an unpolluted environment).

Mowen (2003) offers seven hints for park professionals in attempting to align with health agencies, including: (1) infant health partnerships require baby steps, (2) know the lingo of the health profession, (3) integrate health benefits into all communications, (4) use solid evidence to justify the link between park use and health, (5) don't reinvent the health promotion wheel, (6) create partnerships that provide an incentive for physical activity, and (7) attempt collaboration not competition.

To reposition parks in this way will mirror other international attempts, such as those in Canada. The Canadian Parks/Recreation Association state in its *Benefits Catalogue* (1997) that in the future parks will be: recognized as champions of personal and community wellbeing, central to the quest for human potential, builders of social foundations, catalysts for Canada's green movement, and a cornerstone for economic renewal. This is possible for parks everywhere.

### Health benefits of nature: The evidence

The belief that contact with nature fosters psychological well-being and reduces the stress of urban living seems to be as old as urbanization itself (Ulrich and Parsons 1992; Ulrich 1993), and, as mentioned, was the guiding principle behind the first parks. There are many ways that humans come into contact with nature, including viewing natural scenes, being in natural settings, or encountering plants and animals. Some of these occurrences are "every-day" interactions, and others are more specific and affect people at a deeper level. This section briefly examines everyday human-nature interactions, as well as those interactions with landscapes, wilderness, plants, and animals (Frumkin 2001).

### Viewing nature

In recent decades, landscape researchers have conducted studies to investigate individuals' preferences for natural scenery (e.g., Talbot and Kaplan 1984, 1986, 1991; Talbot et al. 1987; Kaplan and Talbot 1988; Talbot 1988). From the early work of Talbot and Kaplan (1984) through to more recent work by Kaplan (2001), studies generally indicate that people prefer viewing natural landscapes rather than the built environment. Furthermore, there is now considerable empirical and theoretical evidence for the positive effects that simply viewing natural scenes can have on human health.

The healing effects of a natural view (such as those provided by parks) are increasingly being understood in stressful environments such as hospitals, nursing homes, remote military sites, space ships, and space stations (Lewis 1996). In these environments particularly, as well as for people who work in windowless offices, studies show that seeing nature is important and an effective means of relieving stress and improving well-being (R. Kaplan 1992; Lewis 1996; Leather et al. 1998). Research such as this could have important implications for the placement and planning of parks in urban areas.

One famous study examining recovery rates of patients who underwent gall bladder surgery found that those with a natural view recovered faster, spent less time in hospital, had better evaluation from nurses, required fewer painkillers, and had less postoperative complications compared with those that viewed an urban scene (Ulrich 1984). Similarly, Ulrich and colleagues (1991b) studied the effects of different natural and urban scenes on subjects who had just watched a stressful film (horror genre). Measuring a whole array of physiological measures (including heart rate, skin conductance, muscle tension, and pulse transit time—a non-invasive measure that correlates with systolic blood pressure) they found that recovery was faster and more complete when subjects were exposed to natural rather than urban scenes (Ulrich et al. 1991b). The physiological data measured by this study suggests that natural settings elicit a response that includes a component of the parasympathetic nervous system associated with the restoration of physical energy (Ulrich et al. 1991a).

Similar research conducted in prison environments suggests that cell window views of nature are associated with a lower frequency of stress symptoms in inmates, including diges-

tive illnesses and headaches, and with fewer sick calls overall by prisoners (Moore 1981). Natural views can also result in better performance in attention-demanding tasks (Tennessen and Cimprich 1995). Tennessen and Cimprich (1995) gave university students a test and compared scores of students who had natural views to those that did not. They found that those with a view of nature scored better on the test than those with non-natural views. Furthermore, a study by Heerwagen and Orians (1986, cited in Lewis 1996) compared the preferences of office workers for visual décor (i.e., photographs or posters) in windowed and windowless offices. Findings showed that people who worked in offices without windows were four times more likely to choose photographs or posters of outdoor/natural scenes than those who worked in offices with windows; more than 75% of scenes represented in windowless offices contained no buildings or human-made artifacts at all (Heerwagen and Orians 1986, cited in Lewis 1996).

Further evidence shows that access to nature in the workplace is related to lower levels of perceived job stress and higher levels of job satisfaction (Kaplan and Kaplan 1989). Workers with a view of trees and flowers felt that their jobs were less stressful and were more satisfied with their jobs than others who could only see built environments from their window. In addition, employees with views of nature reported fewer illnesses and headaches (Kaplan and Kaplan 1989). A similar study found that a view of natural elements (trees and other vegetation) buffered the negative impact of job stress (Leather et al. 1998).

Parsons et al. (1998) reviewed the literature on commuter stress in car drivers and the mitigating effects of roadside environments. Driving is known to be a stressful activity, and causes several physiological changes in the body, including activation of the sympathetic nervous system, increased blood pressure, increased heart rate, and an increase in heart rate variability (Parsons et al. 1998). Stress recovery and immunization were measured in subjects exposed to one of four simulated drives (drives with forest/rural scenery, drives along the outside of golf courses, drives through urban scenes, and drives through mixed roadside scenery), immediately following and preceding mildly stressful events. Findings demonstrated that participants who viewed nature-dominated drives experienced quicker recovery from stress and greater immunization to subsequent stress than participants who viewed artifact-dominated drives (Parsons et al. 1998).

Kaplan (2001) found that apartment residents had enhanced well-being and greater neighborhood satisfaction when they could look out onto more natural rather than more built settings. However, satisfaction was far greater when residents could see even a few trees than when their view was of large open spaces (Kaplan 2001). Similarly, results from a study by Kaplan (1985) suggested that urban residents who could see gardens found their neighbors to be friendlier and felt their housing development had a stronger sense of community, thus contributing to their neighborhood satisfaction. Furthermore, Kearney (2006) found that having a view of natural environments (particularly forests and landscaping) increased residents' neighborhood satisfaction and suggested that higher-density living, such as highrise living, could be more acceptable if residents have a natural view.

The beneficial effects of viewing nature on psychological state, and in particular mood affect, were examined by Ulrich (1979, 1982, cited in Rohde and Kendle 1994). Ulrich (1979, cited in Rohde and Kendle 1994) found that participants who viewed slides of

unspectacular scenes of nature had an increase in positive mood affect, while those who viewed scenes of urban areas experienced a decline in positive mood affect. In this and a later study, Ulrich (1982, in Rohde and Kendle 1994) concluded that scenes of nature, particularly those depicting water, had a beneficial influence on the psychological state of humans. In their review of the literature, Rohde and Kendle (1994) state that the positive psychological response to nature involves feelings of pleasure, sustained attention or interest, "relaxed wakefulness," and diminution of negative emotions, such as anger and anxiety.

Kaplan and Kaplan (1989) point out that observing or viewing nature is an important form of involvement with it. Much of the pleasure that people derive out of nature comes from opportunities to observe, and much of this observation occurs, not when people are in nature itself, but when they are looking out a window (Kaplan and Kaplan 1989). This type of observation lets the mind wander and provides an opportunity for reflection. It can also aid recovery from mental fatigue. "Mental fatigue" is a term coined by Stephen Kaplan (1987b, cited in Kaplan and Kaplan 1989) and arises from an intense period of concentration or directed attention (whether pleasant or unpleasant) that eventually results in a wornout mental state with symptoms including irritability and a lack of concentration. It has been shown that natural environments are ideal environments to foster recovery from this state. The reason for this is that the act of viewing or observing nature does not require directed or focused attention, but instead requires undirected or effortless attention, which is nontaxing and can restore mental capabilities.

Evidence presented here has demonstrated that just by viewing nature many aspects of human health and development can be markedly improved. Some of these benefits in a park context are summarized in Table 2. Although the benefits are mostly psychological, flow-on effects to physical health have also been documented in the literature. Viewing nature is positive for health, particularly in terms of recovering from stress, improving concentration and productivity, and improving psychological state, particularly of people in confined circumstances such as prisons, hospitals, and high-rise apartments/high density living. From these findings, it is clear that visual access to nature in urban settings should be taken into account and given appropriate priority when planning urban areas. As well as viewing landscapes, however, many therapeutic effects can be gained from *being* in nature.

### Being in nature

Being in natural environments, whether hiking in a World Heritage area or sitting in a local urban park, has many psychophysiological beneficial effects on health (i.e., positive psychological effects that translate into positive physiological effects). Although there is much anecdotal evidence documenting the benefits of "being in nature," the exact effects (for example, by using psychophysiological measures) on the human mind, body, and spirit are still largely unknown. It has been suggested that some of the benefits from being in natural settings arise from a mood state of pleasant arousal and relaxation, resulting from returning to a more cyclical and slower sense of time (Furnass 1979; Nettleton 1992).

Nettleton (1992) reviewed some of the literature describing positive emotional states arising out of time spent in natural settings. A study by Russell and Pratt (1980, cited in

Interaction	Health Benefit
Viewing Nature	Improves concentration, remedies mental fatigue, improves psychological health (particularly emotional and cognitive aspects), and positively affects mood state
	Reduces stress and tension and improves self-reports of wellbeing (positively influencing the immune system by reducing production of stress hormones such as cortisol and corticosterone)
	When exposed to scenes of natural environments subjects recover faster and are more resistant to subsequent stress, which also is likely to boost immunity
	Recovery from a stressful event is faster and more complete when subjects are exposed to natural rather than urban scenes, and heart rate and muscle tension decreases (vet it increases when viewing urban scenes)
	Viewing nature improves performance in attention demanding tasks
	Viewing nature aids recovery from mental fatigue (attention restoration) and encourages reflection by requiring involuntary attention
	Views of flowers and trees in the workplace reduce perceived job stress, improve job satisfaction, and reduce the incidence of reported illness and headaches of office workers
	Trees nearby: decrease levels of fear, incivilities, and violence amongst residents: decrease crime rates in public housing; and improve the life satisfaction of residents
Being in Nature	Natural play settings reduce the severity of symptoms of children diagnosed with Attention Deficit Disorder (ADD) and improve concentration
	Viewing nature enhances residents' satisfaction and makes higher density living more acceptable
	Natural surroundings assist cognitive functioning in children
	Wilderness areas provide spiritual inspiration, enable people to gain a fresh perspective on life, and provide an opportunity to 'get away'.
	Therapy in a wilderness setting heals emotional and psychological conditions and can aid those recovering from substance abuse and violence
	Outward Bound and similar programs use wilderness challenges to boost self- confidence and self-esteem
Observing Plants and Gardens, or Gardening         Community gardens increase community cohesion and enhance self-image of residents           Gardening         Gardening and gardens help people to feel tranqui           In habitat restoration people see a metaphor for the transformation and growth, enhancing psychologic           Gardens improve psychological wellbeing, provide means of self-expression, physical exercise, and so retirement communities           Residents who have nature nearby or regularly pur (e.g. gardening, bird-watching) have greater neigh health and life satisfaction than residents who do n	Community gardens increase community cohesion, reduce graffiti and violence and enhance self-image of residents
	Gardening and gardens help people to feel tranquil and at peace
	In habitat restoration people see a metaphor for their own personal transformation and growth, enhancing psychological wellbeing
	Gardens improve psychological wellbeing, provide environmental stimulation, a means of self-expression, physical exercise, and social interaction for residents of retirement communities
	Residents who have nature nearby or regularly pursue nature-related activities (e.g. gardening, bird-watching) have greater neighbourhood satisfaction, overall health and life satisfaction than residents who do not
Observing / Encountering Animals (Pets and Wildlife)	Pets provide companionship, and an opportunity to nurture and express intimacy, as well as facilitating social networks
	The sight of, or touching a pet can reduce stress, decrease blood pressure and heart rate
	Pet owners report fewer minor health problems and have better mental health than non-owners (regardless of overall health, socio-economic status and physical exercise)
	Owning a pet can reduce the risk factors for cardiovascular disease (systolic blood pressure, plasma cholesterol, plasma triglycerides) independent of lifestyle and other health factors
	Observing native animals, having them nearby, or interacting with them improves quality of life

 Table 2
 Some known health benefits of contact with nature in a park context.

Nettleton 1992) found that parks and gardens were perceived as relaxing and peaceful and were associated with a positive mood state, while supermarkets were perceived as distressing and associated with a negative mood state. A later study conducted at one of the train stations in the Melbourne underground railway system (Parliament Station) found that when asked about what they liked about the station, commuters mentioned a small park (MacArthur Gardens) located just outside the exit of the station that they walked through on their way to the train, whereas the station itself was viewed as sterile, daunting, and stark (Joske et al. 1989, cited in Nettleton 1992).

City life is dominated by mechanical time (punctuality, deadlines, etc.), yet our bodies and minds are dominated by biological time. Conflicts between mechanical and biological time can result in a variety of unpleasant psychosomatic symptoms, including irritability, restlessness, depression, insomnia, tension and headaches, and indigestion (Furnass 1979). If unaddressed, these problems have the potential to eventuate into illnesses that are more serious. The experience of nature in a neurological sense can help strengthen the activities of the right hemisphere of the brain, and restore harmony to the functions of the brain as a whole (Furnass 1979). This is perhaps a technical explanation of the process that occurs when people "clear their heads" by going for a walk in a park and emphasizes the importance of parks in providing communities with access to nature. Furthermore, in the act of contemplating nature, researchers have found that the brain is relieved of "excess" circulation (or activity), and nervous system activity is also reduced (Yogendra 1958).

Nature does have great importance to people. In a survey of 1,900 adults in the US, Cordell et al. (1998) found that approximately 45% of respondents rated wilderness as "very important" or "extremely important" for spiritual inspiration, and a further 56% stated that just knowing it exists was "very important" or "extremely important." This confirms the conceptual importance of nature to people described by Kaplan and Kaplan (1989).

Being in natural environments invokes a sense of "oneness" with nature and the universe, and can lead to transcendental experiences (Rohde and Kendle 1994). This is more likely to occur in wilderness settings, although as it relates to subjective experience it is probable that nature in urban environments could produce the same effect.

In order to encourage people to be in nature, the accessibility of urban green spaces should be considered. With current trends in Australia and other Western countries towards an aging demographic, it is important to make urban green space accessible to all. Furthermore, urban green spaces should be created as beautiful places in cities—places that are socially cohesive and promote social solidarity (Ward Thompson 2002).

### **Restorative settings**

The increasing complexity of both technological tasks and the built environment is generally a source of many negative stress response patterns for the majority of people (West 1986, cited in Lewis 1996). In contrast, the natural environment has been found to have a restorative quality, particularly for people who live in urban environments. Natural places such as parks offer an opportunity to become revitalized and refreshed. Living in urban areas often means dealing with environmental demands such as crowds, noise, pollution, and primarily

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uniformed structures. It has been demonstrated that these factors can cause mental fatigue and exhaustion (Furnass 1979; Rohde and Kendle 1994), whereas exposure to nature has been demonstrated to have the opposite effect. Symptoms of mental fatigue include: decreased ability to concentrate and solve problems, heightened irritability, and a greater susceptibility to make mistakes or cause accidents (Herzog et al. 1997).

Rachel Kaplan and Stephen Kaplan (Kaplan and Kaplan 1989, 1990; R. Kaplan 1992; S. Kaplan 1992, 1995) have developed the notion of "restorative environments" that foster recovery from this state of mental fatigue. Restorative environments require four elements: fascination (an involuntary form of attention requiring effortless interest, or curiosity); a sense of being away (temporary escape from one's usual setting or situation); extent or scope (a sense of being part of a larger whole); and compatibility with an individual's inclinations (opportunities provided by the setting and whether they satisfy the individual's purposes) (Kaplan and Kaplan 1989; Hartig et al. 1991). Parks are ideal for restorative experiences due to their ability to satisfy the four elements described above. When comparing a walk in a natural setting (a park), a walk in an urban setting, and relaxing in a comfortable chair, Hartig et al. (1991) found that mental fatigue was most successfully relieved by a walk in a park.

Furthermore, Kaplan et al. (1998) suggest that the implications for design and management of natural environments to be restorative are vast and vital. They suggested that the natural setting may be beneficial to not only its immediate users but also to those who view it from afar. In addition, they stated that "if treated as the opportunity for increasing the sanity and welfare of those who can see it, it becomes every bit as important as hallways and lighting" (Kaplan et al. 1998:77). Herzog et al. (2002:295), reporting on a study of undergraduate students in the USA, concluded that "the restorative potential of natural settings is probably underappreciated." This is supported by the results of research by Hartig et al. (2003), also involving university students, in which the restorative effects of natural settings were accentuated by the negative effects associated with the urban surroundings and windowless room that acted as "controls."

In recent years, Frances Kuo and her colleagues (2001) have conducted research to examine the effectiveness of the attention restoration theory in the inner city context. Their work has focused on high-rise residents and the effects of nearby nature on a range of factors, including the ability to cope with major life issues, attention deficit disorder (ADD), and children's self-discipline. For example, a study conducted by Taylor et al. (2002) examined the relationship between nearby views of "green" nature and children's ability to concentrate, inhibit impulses, and delay gratification. They found that the more "green" a girl's view from her high-rise window was, the better able to concentrate and the more self-disciplined she was.

Similarly, Kuo (2001) examined whether nearby nature affects high-rise residents' ability to cope with poverty and life issues. She found that residents with "green" surroundings were able to pay attention more effectively and found their major life issues to be less difficult to deal with than their counterparts with "barren" surroundings. Furthermore, Taylor et al. (2001) tested whether attention restoration theory could be applied to children and their capacity to deal with ADD. Through the use of parental surveys, children were tested for their attentional functioning in a range of play settings, and green settings were found to be most effective in enhancing attention. The authors concluded that the "greener" a child's play setting, the less severe her ADD symptoms appeared (Taylor et al. 2001).

## Leisure and recreation

Leisure and recreation experiences in natural environments probably reduce stress through a number of mechanisms, including a sense of control through active coping or escape, and the therapeutic effects of exposure to natural environments that most likely have learned as well as biological origins (Ulrich et al. 1991a). For example, many people each year flock to parks and wilderness areas for their annual holiday to "experience" the wilderness, and the number of people seeking these experiences is increasing (Freimund and Cole 2001). Associated with this is a rise in the number of people pursuing non-consumptive naturerelated recreational activities, such as bird-watching. This is often referred to as "wildlifewatching" or "watchable wildlife" and includes observing, feeding, or photographing wildlife (US Department of the Interior et al. 1996). Much work has been carried out on this topic in the United States, and although similar trends are likely in Australia, there are almost no data on wildlife watching by Australians or visitors to Australia (D. Jones, personal communication).

Recreation in the natural settings provided by parks is becoming increasingly important as our lives become dominated by indoor activities. Some authors anticipate that allowing people to interact with nature (such as spending time in parks during the working week) to reduce tension and increase competence and productivity, will eventually become socially accepted and actively encouraged (S. Kaplan, cited in Lewis 1996). Pursuing recreation in a park setting enables people to develop a clearer understanding of their relatedness to nature, which can influence their everyday lives and preferences (Martin 1996). This can have quite a powerful effect as a form of intervention treatment—for example, as used in wilderness therapy.

Wilderness and related studies clearly demonstrate that being in a natural environment affects people positively, although the exact benefits are still largely unknown. There are also multiple benefits from brief encounters with nature or experiencing nature on a smaller scale, such as in urban parks. As outlined by Woolley (2003), the most obvious benefits and opportunities that urban green spaces may provide for inner-city living are social benefits: that is, opportunities for people to participate in events and activities. Similarly, the Sydney Urban Parks Education Research (SUPER) Group (2001) stated that urban green space, in particular parks and gardens, may generate a range of social and economic values for the Australian community. These benefits may include:

- Opportunities for activity for older people;
- Supervised child-care;
- Health improvement and fitness motivation;
- Education in sport, environment and other endeavors; and
- Individual personal development.

Survey work has shown that nature is important to people, and the number of people seeking nature-related recreation overseas is increasing. Similarly, research indicates that in

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Sydney, Australia, inner-city residents have the highest visitation rate to urban parks, no doubt due to small or non-existent personal gardens or backyards (Veal 2001). Some of the benefits of being in nature in a park context are presented in Table 2.

## Contact with plants: Incidental exposure to plants

What effect does simply having plants, parks, and gardens in close proximity have on human health? Street trees and other people's gardens, fields and unused lots, courtyards, and landscaped areas that are encountered in one's daily travels (as separate from parks or designated recreational areas) constitute important opportunities for experiencing nature (Kaplan and Kaplan 1989). In a study of apartment dwellers in the USA, Kaplan (2001) found that views of trees, gardens, and grassy areas were important for participants' well-being and were factors in neighborhood satisfaction. Kaplan suggests that "incidental" exposure to plants via window views may be far from "incidental"-that it may, in fact, provide "micro-restorative opportunities" that may accumulate to "provide long-term contact with the natural environment" (2001:540). Similarly, in a study of low-income children in the USA, Wells (2000) found that the "greenness" of their home environment (predominantly related to views from various windows) impacted on their cognitive functioning, with greater levels of "greenness" associated with higher cognitive functioning. Kearney, reporting on a study of residential density and neighborhood satisfaction, found that density per se was less important than "opportunities to visit nearby shared space and having views of nature from the home" (2006:112).

Even the knowledge that there is nature nearby (e.g., parks) has proven to have important effects on residents' satisfaction with their neighborhood, despite the fact that they may not make use of it regularly (Kaplan and Kaplan 1989). Rachel Kaplan and Stephen Kaplan refer to this as "conceptual" involvement in nature. Its benefits stem from the fact that nature is important to people and they value its presence, even though they may not experience it on a daily basis. Another study found higher neighborhood and life satisfaction among individuals who more regularly pursued gardening and other nature-related activities (such as bird-watching) than among those who did not have such interests (Frey 1981, cited in Kaplan and Kaplan 1989). People with access to nearby natural settings or parks have been found to be healthier overall than other individuals, and the long-term, indirect impacts of "nearby nature" can include increased levels of satisfaction with one's home, job, and with life in general (Kaplan and Kaplan 1989). A study by Wells and Evans of nearby nature as a buffer against stress among rural children found that "the impact of life stress was lower among children with high levels of nearby nature than among those with little nearby nature" (2003:311).

The observational mode of experiencing plants mentioned previously can occur wherever and whenever people encounter plants (Lewis 1990). Whether in parks or buildings, they are islands of green that provide opportunities for people to become refreshed by experiencing nature. Research has demonstrated that even brief encounters with nature can improve one's capacity to concentrate and remedy mental fatigue (Kaplan and Kaplan 1990; S. Kaplan 1992, 1995). Failure to recognize, and to maximize, the benefits available from nearby plants, parks, and other natural settings could have serious consequences (Kaplan and Kaplan 1989). Considering the positive psychological effects that vegetation has on all sectors of the community, it seems unwise not to use this knowledge to improve productivity and quality of life. Too often parks and landscaping are considered as optional "amenities" rather than as essential components of urban design (Kaplan and Kaplan 1989).

### Contact with animals: Companion animals

It is now widely recognized that healing influences exist in the relationships of humans to their pets (Birch 1993) and that people who own pets have better mental health and wellbeing than non-pet owners (Straede and Gates 1993; Rowan and Beck 1994). On the strength of this evidence, Rowan and Beck (1994) and others (Beck 1987; National Institutes of Health 1987; Bustad 1996; Fawcett and Gullone 2001) believe that there is a pressing need for detailed and serious research of human–animal interactions in large study populations. Some authors believe that because pet ownership cannot be patented and sold as a drug, however, there has been less than satisfactory research interest and funding into the health benefits of pet-keeping for individuals. A similar scenario exists for the effect of companion animals on societal health, and here too there is enough evidence to indicate that there are many benefits to be gained (Rowan and Beck 1994).

In terms of companion animals, parks provide an important outlet for people to interact with their pet (mostly applicable to dog owners), both formally (e.g., training) and informally (e.g., play). An added benefit is the opportunity to also interact socially with other pet owners and park users, expanding or enhancing social networks. It is also important to emphasize the opportunity that parks provide for observing or encountering wildlife, particularly in those protected area parks that preserve the habitat of native fauna.

### Contact with animals: Wildlife

Apart from interactions with pets and other domesticated animals, humans also interact in various ways with wildlife. In the US and Canada more people visit zoos and aquariums each year than attend all professional sports events combined (Wilson 1993). Since its opening in the year 2000, the Melbourne Aquarium boasts an annual visitation rate of one million (Oceanis Australia 2002). In zoos and aquariums, visitors can safely view, interact with, and learn about animals that they would rarely encounter (or that are too dangerous to encounter) in the wild. There are also increasing numbers of people seeking contact with animals in their natural environment, particularly marine mammals, such as dolphins and whales. In Port Phillip Bay in Victoria up to 15,000 visitors each summer book organized tours to view and swim with dolphins. Increasing visitor pressure from tourists is so great in fact, that concerns are mounting for the welfare (and long-term survival) of the animals (Linnell 2002; Dolphin Research Institute Inc., n.d.).

Furthermore, in a national US survey on recreational interests (the National Survey on Recreation and the Environment, conducted in 1995) bird-watching was found to be the

fastest-growing recreational activity (Cordell et al. 1999). Other specific wildlife-watching pursuits are also emerging, such as butterfly-watching and whale-watching (Youth 2000). Whale watching in particular has gained immense popularity over the last couple of decades, and is the backbone of the tourist industry in towns such as Hervey Bay, Queensland, Australia. The enormous increase in wildlife-based ecotourism is indicative of the desire humans have to interact with nature, particularly animals.

Interacting with animals has multiple positive physiological and psychological effects on human health including: decreasing blood pressure, heart rate, and cholesterol; reducing anxiety and stress, and providing protection against stress-related diseases; provision of companionship and kinship; and offering the opportunity to nurture. All of these factors improve the quality of life and health. Parks are important in providing a setting for pet owners to interact both with their pet and with other pet owners and park users, which can positively influence the social aspects of health. Parks also preserve the habitat of native wildlife, providing people with the opportunity to observe or encounter animals in their natural environment. Some of the main benefits with specific relevance to parks are presented in Table 2.

### Health benefits of nature: In practice

Further evidence for the positive effects on health and well-being from contact with nature is found in some unique forms of therapy based on the human relationship with nature. These forms of treatment have proven to be successful where conventional treatments have often had limited success.

**Ecopsychology, or nature-guided therapy** Ecopsychology, or nature-guided therapy, considers every aspect of the human-nature relationship. It is primarily concerned with the fundamental alienation of humans from nature and its effects on human health (Burns 1998; Gullone 2000; Scull 2001). The person–environment relationship is both the unit of analysis and the basis of treatment (Burns 1998). Although only relatively recently adopted in modern Western society, ecopsychology is essentially a modern interpretation of ancient views of humans and nature held by many indigenous peoples. In essence, most native cultures view humans as part of the rest of nature by believing that human beings are intricately linked to all life forms and life-like processes, and that by harming nature we harm ourselves (Suzuki 1990; Rockefeller and Elder 1992; Orr 1993; Knudtson and Suzuki 1994; Martin 1996; Burns 1998).

As echoed by researchers in other fields, ecopsychologists believe that disconnection from nature has a heavy cost in impaired health and increased stress (Katcher and Beck 1987; Glendinning 1995; Burns 1998; Gullone 2000; Scull 2001). Clinical ecopsychology operates on the premise that many psychological and physical afflictions can be due to withdrawal from the healing forces of the natural world (Levinson 1969; Roszak et al. 1995; Scull 2001). No longer able to identify with nature and its representatives, humans find themselves in a psychological void (Nasr 1968). However, people may be able to regain some emotional harmony by re-establishing a bond with the animate and inanimate world (Levinson 1969, 1983). Many Western psychologists are now readily adopting ecopsychology as a form of treatment or are subscribing to its views (Durning 1995; Hillman 1995; Roszak et al. 1995; Burns 1998). In fact, the field of mainstream psychology is undergoing a paradigm shift as a result of new problems brought about by urban existence and the destruction of the natural environment that are proving difficult to treat (Hillman 1995). The Australian psychologist George Burns (1998) reviewed a selection of nature-based interventions. The work cited by him included the following beneficial effects from contact with nature: enhancement of positive affect, stress reduction, improvement in parasympathetic nervous system functioning, and enhancement of self-concept, self-esteem, and self-confidence.

Although ecopsychological treatment usually involves excursions into wilderness, it is now recognized that any exposure to nature, such as spending time with plants and animals, or going to a park, can have positive benefits (Cohen 2000; Scull 2001). Burns (1998) has documented his success treating patients with simple nature-based assignments. These assignments use natural objects or natural processes that have in the past assisted the patient with achieving a therapeutic goal, or are likely to do so in the future. Burns has successfully treated patients suffering from a variety of negative psychological states associated with severe trauma, cancer, depression, and anxiety, using nature as the basis for treatment.

Although there is a lack of scientific research in this area, in a similar way that wilderness therapy and outdoor adventure therapy also lack research evidence of their efficacy, anecdotal evidence suggests that ecopsychology is particularly successful in treating stressrelated illness. However, unlike wilderness therapy and outdoor education, from which the benefits may be short-term, ecopsychological treatment is believed to have more lasting positive benefits than ordinary outdoor recreation (Scull 2001).

Stainbrook (1973, cited in Lewis 1996) states that an over-urbanized, dirty environment, and a lack of natural surroundings, confirm the negative self-appraisal a person may have developed through other negative contacts with society. Since self-esteem is the keystone to emotional well-being, a poor self-appraisal, among other factors, determines how people treat their surroundings and how destructive they will be towards themselves and others (Stainbrook 1973, cited in Lewis 1996). If the self were expanded to include the natural world, behavior leading to destruction of natural systems would be interpreted as selfdestruction (Roszak 1995).

Hence, to suggest with the full weight of professional psychological authority that people are bonded emotionally to the earth gives a powerful new meaning into our understanding of the term "sanity" (Orr 1993; Roszak 1995). Furthermore, as Levinson (1969, 1983) states, humans must remain in contact with nature throughout life if they are to maintain good mental health, not too mention their humanity. It has been proposed that the modern life as prescribed by Western society results in adverse outcomes on the human psyche (Gullone 2000), the full impacts of which are yet to be realized.

**Attention restoration** Attention restoration theory suggests that contact with nature improves the ability to concentrate and aids recovery from mental fatigue. Mental fatigue, as mentioned earlier, can arise from extended periods of directed attention on a particular task, while shutting out distractions (Herzog et al. 1997). Symptoms include a lack of concentration, increased irritability, and a proneness to mistakes or accidents. The effect of nature on

children's capacity for concentration was studied by Taylor et al. (2001), who tested the ability of nature to improve the concentration of children diagnosed with ADD. They found that children functioned better after activities were carried out in natural play settings, and that the "greener" a play setting, the less severe the attention deficit symptoms (Taylor et al. 2001). ADD affects many children and can have a detrimental effect on most aspects of life, including school, interpersonal relationships, personal growth, etc. (Taylor et al. 2001). It is not an easy disorder to treat, but natural settings could be used to improve children's concentration, thereby somewhat alleviating the need for drugs, which have serious side effects and do not aid children's long-term health or development (Taylor et al. 2001). This research highlights the importance of "green" playgrounds and the availability and access to parks and nature for child-care centers, kindergartens, and schools.

However, attention restoration is not just relevant for children, but has increasing relevance for adults in the current social and economic environment in which people are working longer hours and spending long periods of time looking at computer screens. While Hartig et al. (2003) demonstrated that natural environments have both stress-reducing and attention restoration benefits for young adults (university students), a study by Herzog et al. (2002), also involving university students in the USA, found that recognition of the restorative effects of natural environments was limited. Herzog et al. (2002) suggest that strategies to address this lack of awareness should include communication of the benefits through images and narratives, and urban design that brings people closer to nature.

**Wilderness experience and wilderness therapy** As well as being restorative in terms of attention enhancement and stress reduction, natural environments can also be used educationally and therapeutically for other purposes. The terminology for such activities varies, and includes "outdoor education," "outdoor adventure," "wilderness experience," "wilderness therapy," "wilderness adventure therapy," and "bush adventure therapy." Whatever the terminology, participation in such activities is typically undertaken for physical, emotional, and/or psychological health reasons (Mitten 2004). However, its potential as a population-wide health promotion tool has only recently been recognized (Pryor et al. 2005).

Challenges presented by wilderness are used in wilderness experience programs such as Outward Bound to boost the self-confidence and self-esteem of participants. These programs encourage leadership ability, social cohesiveness, and facilitate an increased awareness of, and respect for, nature (Furnass 1979). Although these benefits can be substantial and have a long-term effect on individuals, it has been claimed that they are somewhat superficial compared to the psychological and spiritual benefits that can arise from contact with wilderness itself (Cumes 1998).

At least one wilderness program, however, draws on this aspect, namely the Wilderness Vision Quest Program, run in the United States (Easley 1991). This program, founded in 1976, emphasizes the spiritual dimensions of contact with the natural world and focuses on fostering conscious efforts to heal, enrich, and expand the human spirit (Brown 1984, cited in Easely 1991). Deeper experiences with wilderness are used in the emotional and psychological treatment of patients suffering from any number of conditions, including psychosis, substance abuse (Bennett et al. 1997) or violence, and injury (Crisp and O'Donnell 1998;
Beringer 1999). The combination of physical activity and social connection in the context of the natural environment has been found to be effective in preventing both the onset and the escalation of depression (Crisp and Hinch 2004). However, the multifaceted nature of the outcomes of such programs (particularly their broader social and environmental well-being outcomes) is often forgotten in the intense focus on the outcomes for individual participants. "When small groups of people adventure together in natural environments, the health and well-being of humans, communities and the natural environment are enhanced" (Pryor et al. 2005:11).

This area is only just beginning to be understood and no appropriate terms exist for the powerful effect of nature on the human psyche, although the term "wilderness rapture" has recently been suggested by Cumes (1998). More thorough research on wilderness therapy programs is required, particularly to determine whether beneficial effects on participants' lives are long-term. One commonly reported outcome of wilderness therapy is that self perceptions and perceptions about the one's relationship to the natural world change (Kaplan and Kaplan 1989). This can assist people in finding meaning or higher purpose in life.

**Horticultural therapy** Historically, plants are associated with healing (Lewis 1996) and the medicinal properties of plants used by ancient societies are still employed in the present day (e.g., traditional Chinese medicine, naturopathy). However, the use of plants in mental health therapy has now also been well established by the field of horticultural therapy (Relf 1992; Lewis 1996; Frumkin 2001). The restorative and therapeutic aspects of gardening are being used in a wide range of settings, including hospitals—where they are often referred to as "healing gardens" (Hartig and Cooper-Marcus 2006:536)—geriatric centers, drug rehabilitation centers, prisons, and schools for the developmentally disabled (Lewis 1990).

In a study conducted in retirement communities, residents had a strong preference for natural landscapes and, in fact, "pleasantly landscaped grounds" were a determining factor in their choice of retirement home (Browne 1992). The same study described how contact with plants (and nature) affected well-being. Five benefits were identified: psychological well-being, environmental stimulation, self-expression and personalization, motivation for physical exercise, and social interaction and networking (Browne 1992). Similarly, the use of horticultural therapy within a residential facility for people experiencing on-going mental health problems has provided benefits in terms of encouraging social interaction, providing opportunities for creativity and self-expression, and increasing self-esteem and confidence (Parker 2004).

The increasing popularity of therapeutic gardens within hospitals is supported by a study which found that visiting the garden associated with a children's hospital was a restorative experience (Whitehouse et al. 2001). Pilot data collected in a later study of the same facility (Sherman et al. 2005:181) revealed positive benefits in terms of "anxiety, sadness, anger, worry, fatigue, and pain" when comparing those inside the gardens with others inside the hospital building. Some healing gardens are reported to serve a dual purpose: as a place of prayer for those of faith, and as a place of nurture for others. In one facility for Alzheimer's patients, a "wandering garden" featuring a secure area for walking through a garden of non-toxic plants helps to evoke memories and to reconnect patients with the world

(Rauma 2003). Similar "wander gardens" have been used elsewhere with patients undergoing post-stroke rehabilitation, and have been shown to be beneficial for stimulating both mental and physical functions (Detweiler and Warf 2005).

Horticultural therapy is based on our emotional responses to nature, in this case to plants. Sensory gardens used in horticultural therapy provide people with a range of ways to respond to the plants and the setting, using the five senses (Lynch 2005). Plants, like animals, are non-judgmental, non-threatening, and non-discriminating, and can be an effective means of reaching someone who is not responding to conventional treatment (Lewis 1996). The growth of plants has a universal attraction in that it presents opportunities for interaction at a number of levels of intelligence, skill, and maturity (Lewis 1996). Of course, different people have different responses to nature, and what works for some may not work for others. Despite this, advocates for horticultural therapy rely on the innate connection that human beings have with living nature and the positive feelings that plants evoke within people (Lewis 1996). Horticultural therapy has been found to be highly beneficial, particularly to people with disabilities and to the elderly (e.g., Heliker et al. 2000; Pachanal et al. 2003).

However, although there appear to be health benefits to be bestowed on all age and ability groups in the act of gardening, further empirical research is warranted (Söderback et al. 2004; Relf 2005). It is likely that many of the benefits of horticultural therapy are experienced also by members of friends of parks and other environment groups, although the health of these groups has not yet been investigated.

#### **Policy outcomes**

**Parks, nature, and triple bottom line reporting** Triple bottom line reporting is a framework for measuring and reporting corporate performance against economic, social, and environmental parameters (SustainAbility Limited 2002; Elkington 1997). With their environmental and social focus, park management agencies were perhaps some of the earliest organizations to pursue the triple bottom line, before it was popularized as such. As it has become established in the business community, however, park organizations have almost seamlessly updated their approach to conform to contemporary triple bottom line concepts.

In parks management, the social bottom line previously has been satisfied by tailoring parks to visitor/user needs, enabling access for all user groups, supporting extensive volunteer and community projects (particularly friends groups and providing community grants), providing education and interpretation, and promoting and protecting significant environmental and cultural heritage sites. Now, parks have the opportunity to expand their social bottom line in terms of the key role they play in human health and well-being.

Human health and well-being is taking on an expanded role in triple bottom line reporting and sustainability. In fact, it has been hailed as one of the key indicators for sustainable development (Kickbusch 1989a). What is needed, however, is a focus on social equity, social investment, and social innovation in health and environment policy (Kickbusch 1989b). By promoting the health benefits of interacting with nature, and assuming a role in public health, parks could provide the innovation required. The triple bottom line and public health The triple bottom line is almost effortlessly integrated into public health if an ecological approach to public health is adopted. Public health requires an expansion of the knowledge base underlying environmental health to include the triple bottom line of social, economic, and environmental outcomes in interpreting human–environment interactions (Brown 1996). In other words, these two disciplines can easily be combined in order to satisfy the requirements of the triple bottom line. Furthermore, it is important that the scope is broadened to include links between global, national, and international scales (Brown 1996). This is echoed in the concept of biohistory established by Stephen Boyden (Boyden 1992, 1996, 1999), relating to global human health and its total reliance on the health of the biosphere. As Boyden (1999) states, human society and culture have the capacity to affect the biosphere, both positively and negatively, and vice versa.

The triple bottom line concept is essentially the principle of an ecological theory of health put into practice. It entails enhancing individual and community health, well-being, and welfare by following a path of economic development that does not impair the welfare of future generations, providing for equity between and within generations, and protecting biodiversity and maintaining essential ecological processes and life support systems (Brown 1996).

#### Recommendations

It is clear from the evidence that humans have strong ties to nature that include physical, mental, and spiritual ties. Understanding how and why has partly been explained by theories such as biophilia, but researchers are still a long way from knowing all of the answers. More work is needed. Unfortunately, if governments, other decision-makers, and individuals wait for complete knowledge before changing current policies and lifestyles that are not sustainable, we may damage the health of the biosphere beyond repair, with potentially devastating consequences for humans.

As an outcome of the findings reported here, recommendations to governments, planners, park management bodies, and health policy makers are:

**Support further research** Further research is required to remedy gaps in current knowledge, to further knowledge in this area, to facilitate decision-making and policy formulation, and to foster interdisciplinary research into the benefits to individuals and communities to be gained from contact with nature. Specifically, research should be focused on:

- Collecting further empirical evidence demonstrating the health and well-being benefits of contact with nature;
- Exploring new opportunities for application of the health and well-being benefits of contact with nature by investigating nature-based interventions to address existing and emerging health problems;
- Exploring opportunities for using the health and well-being benefits of contact with nature as a preventive "upstream" health measure.

**Encourage and facilitate the repositioning of parks** First, by *communicating* to governments and the wider community that:

- Contact with nature is essential to human health and well-being;
- Through providing access to nature, parks improve and maintain human health and well-being (both at an individual and community level);
- By improving and maintaining human health and well-being, parks have the potential to reduce the burden on the health care system;
- Contact with nature and parks facilitates an holistic/ecological approach to health and well-being that is beneficial to individuals and society, as well as to the environment; and
- Through providing an holistic/ecological approach to health, contact with nature and parks reinstate people with a sense of empowerment and control over their own health and well-being.

Second, by *educating* government departments, health professionals, and the wider community about:

- How the above can be applied for improved health and well-being;
- How to incorporate this knowledge into public health policy and health promotion;
- How to collaborate in the pursuit of common goals; and
- The need for broadening the knowledge base in this area (via further research) for future dissemination.

Third, by *facilitating* the engagement of the community with nature in order to re-establish the importance of nature in people's lives and cultivate a holistic attitude towards life and health by:

- The communication and education outlined above;
- Continued exploration of the benefits to individuals and communities to be gained from contact with, and preservation of, nature through parks and other reserves; and
- Fostering park management practices that support community engagement with nature.

# **Develop ways of integrating parks and nature into public health** Several considerations are relevant:

- Cooperation through a partnerships approach is required between government departments, park management agencies, health professionals, and researchers to successfully integrate parks and nature in public health.
- Health promotion agencies have already recognized the need for innovative, "upstream" approaches to health and well-being, and are seeking potential alliances and opportunities to this end.
- It may be beneficial to initiate this process by examining how contact with nature via parks could be used as a preventive measure, potentially contributing to, for example,

the Australian National Health Priority Areas of Cardiovascular Disease and Mental Health.

• The use of parks and nature to improve health and well-being is supported by the Jakarta Declaration (World Health Organization 1997) and its predecessor, the Ottawa Charter for Health Promotion (World Health Organization 1986), which call for creating supportive environments (both natural and social) and a reorientation of health services to be shared among individuals, community groups, health professionals, health service institutions, and governments.

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# The Prairie Dog: A Century of Confusion and Conflict in Park Management

# Daniel S. Licht, Cay Ogden, and Myron Chase

**OF ALL OF THE NATIVE SPECIES FOUND ON NATIONAL PARK SERVICE (NPS) LANDS**, perhaps none have been as maligned by park managers as the various species of prairie dog (*Cynomys* spp.). Conversely, no native species has tormented as many park managers as the prairie dog. Arguably, throughout the agency's long history the management of the prairie dog, and especially that of the black-tailed prairie dog (*C. ludovicianus*), has been one of its most difficult, discordant, and acrimonious wildlife issues. Even today, the perception of prairie dogs, both within and outside the agency, ranges from a charismatic keystone species worthy of conservation to a pest worthy of extermination. In this paper we document the history, current status, and management of black-tailed (*C. ludovicianus*), Gunnison's (*C. gunnisoni*), whitetailed (*C. leucurus*), and Utah (*C. parvidens*) prairie dogs within the national park system (a fifth species, the Mexican prairie dog, *C. mexicanus*, is not found in NPS units). Most wildlife issues that challenge park managers can be found embedded in prairie dog management.

#### History of prairie dog management in the National Park Service

Despite laws and policies to conserve native wildlife, the NPS has often struggled to achieve such goals (Sellars 1997). Prairie dog conservation is no exception. At the time the agency was established in 1916 there was little public support for prairie dogs and the prairie dog ecosystem. The general consensus was that the animals competed with cattle for forage and that they had no redeeming value. As a result, prairie dog eradication was widespread and on-going (Knowles et al. 2002; Forrest and Luchsinger 2006). Yet the NPS was charged with preserving all wildlife. Inevitably, the federal agency was pitted against neighboring landowners, county and state governments, farm and ranch lobbies, and others.

For example, in 1952 the South Dakota state legislature requested that Congress exterminate all prairie dogs within Badlands National Park (Ulrich and Lee 1993). A compromise was eventually reached whereby sanctioned poisoning within the park was restricted to within one-half mile of the boundary; however, in reality most of the park population was eradicated, apparently due to illegal poisoning by lessees (there were existing grazing leases within the park at that time). The famed biologist Adolph Murie speculated that the near-eradication of prairie dogs at the park may have caused the extirpation of black-footed ferrets (*Mustela nigripes*), which later were declared an endangered species (cited in Ulrich and Lee 1993). Unauthorized poisoning, most likely by neighboring landowners, also occurred within Theodore Roosevelt National Memorial Park (later redesignated as Theodore Roosevelt National Park) about the same time (Norland and Bradybaugh, n.d.).

A turning point in prairie dog conservation was the 1958 publication of Carl Koford's landmark monograph *Prairie Dogs, Whitefaces, and Blue Grama* (Koford 1958). Koford documented the rich biological diversity associated with prairie dogs, and he questioned the claims that prairie dogs destroyed vegetation and made the land unfit for livestock. A large portion of Koford's research was conducted in NPS units in the northern Great Plains. His report generally sheds a positive light on the agency (e.g., the frontispiece is a photograph of prairie dogs in front of Devils Tower National Monument); however, he does describe NPS poisoning of prairie dogs. He also noted that state legislatures often pressured the agency to eradicate prairie dogs in the belief that park units were a source for prairie dog infestations,



**Figure 1** Distribution of prairie dogs and locations of NPS units. See Table 1 for key to identification numbers of parks.

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an argument that is still common today. As further evidence that some things don't change, Koford noted that at Devils Tower people put out "peanuts, bread, popcorn, potato chips, and other goodies for the prairie dogs" and therefore the animals are "grotesquely fat" (p. 60).

Although Koford's monograph initiated a change in the scientific and conservation communities' attitudes toward prairie dogs, it did not sway ranchers, park neighbors, and agricultural lobbies. For example, in 1980 Badlands National Park was at the center of a lawsuit filed by the American Farm Bureau Federation against the departments of Agriculture and Interior whereby the plaintiffs sought relief from depredation by prairie dogs (it was settled out of court in 1994). State laws continued to be anti-prairie dog and therefore complicated or thwarted NPS efforts to conserve the species and fueled the state–federal controversy over the jurisdiction of wildlife (see Buono 1997).

Pressured by the conflicting and incompatible demands from ranchers, neighbors, and state legislatures on the one hand, and from the scientific and conservation community on the other, NPS often found itself contorting its management principles to satisfy both groups. For example, in the early 1980s staff at Wind Cave National Park shot and poisoned prairie dogs in response to outside pressure. Yet when park staff was questioned about the need for the control they said the poisoning was necessary to conserve the park's biological diversity, a scientifically insupportable claim given that the black-tailed prairie dog is recognized as a keystone species (Kotliar 2006; Miller et al. 2007). Furthermore, park staff said that reducing prairie dog distribution from 1,800 acres to 700 acres would still provide "adequate" habitat for black-footed ferrets (Fisher 1982), an assertion which was well below the minimum established by the scientific community at the time (US Fish and Wildlife Service 1978).

Roemer and Forrest (1996) researched federal and state prairie dog control programs in the northern Great Plains during the period 1982–1992. They found that lethal control (i.e., poisoning, shooting) of prairie dogs occurred at Badlands (5,423 acres treated), Devils Tower (trace amounts of poison used), Theodore Roosevelt (trace amounts), and Wind Cave (1,922 acres). However, the actual acreage treated was likely less because some of the control actions were probably re-treatments.

As the 20th century came to a close, the public's attitudes toward prairie dogs had become more positive, scientists had better documented the ecological value of the species, and NPS was becoming more confident in its conservation mission. As a result, the agency began showing more support for prairie dogs and more restraint in control programs (Supernaugh 1999). In some cases, NPS units not only conserved existing prairie dog populations, they also reintroduced prairie dogs where they had been extirpated. For example, Bryce Canyon National Park reintroduced the endangered Utah prairie dog.

Prairie dog management entered a new phase on July 31, 1998, when the National Wildlife Federation (NWF) petitioned the US Fish and Wildlife Service (USFWS) to list the black-tailed prairie dog as threatened throughout its range. Although the Utah prairie dog had been listed under the Endangered Species Act (ESA) for some time, that was a comparatively low-profile listing because that species was found only in one NPS unit. In contrast, the black-tailed prairie dog is found in several NPS units and has a much more significant impact on plant communities and farm and ranch operations. As a result of the petition, on January 14, 1999, the regional director of the NPS Midwest Region signed a memorandum halting all prairie dog control on NPS lands in the region (with the exception for human "health and safety"; Schenk 1999). The memo stated that the petition brought the agency "to a point in time where we must consider our past views and actions toward this often maligned species."

Approximately one year later, the NPS associate director for natural resource stewardship and science sent a memo to USFWS clarifying NPS's position on prairie dogs (Soukup 1999). The memo stated that control actions were limited to (1) human health hazards, (2) threats to cultural resources, and (3) "good neighbor" purposes (Soukup 1999). The narrow scope of "threats to cultural resources" may have been unintentional because most agency justifications for control used a broader criterion about impacts to other park resources. The "good neighbor" policy has never been defined in detail, but it is generally interpreted to mean that if an abutting neighbor complains about prairie dogs moving onto his or her property, or having the potential to do so, the park may take control actions to mitigate the neighbor's concerns. The memorandum requested that—if the species were listed—USFWS allow NPS to continue the aforementioned control policies.

On February 4, 2000, USFWS responded to the NWF petition by designating the black-tailed prairie dog a candidate species, meaning there was sufficient evidence to list it as threatened (USFWS 2000). At that time lethal control for black-tailed prairie dogs ceased on NPS lands. However, on August 18, 2004, the species was removed from the candidate list, with USFWS justifying the removal on evidence that the distribution, abundance, and trend data were not as dire as earlier believed (USFWS 2004). As a result of the revised status, and the acrimony surrounding the species, the Midwest Regional Office of NPS issued a new and more lenient policy on black-tailed prairie dogs (Quintana 2004). The memorandum re-opened the door to lethal control; however, it stated that "any park with prairie dog conservation issues must complete a park prairie dog conservation plan." On December 2, 2008, USFWS once again elevated the status of the species by issuing a 90-day finding that a new petition to list the species presented substantial information, thereby initiating another 12-month review as to whether the species warrants listing under the ESA (USFWS 2008b).

#### **Current status**

There are at least 21 NPS units with prairie dogs (Table 1). The area occupied by prairie dogs on NPS lands is estimated at 14,576 acres, with 83% of those acres being inhabited by black-tailed prairie dogs. Because black-tailed prairie dog densities are much greater than those of the white-tailed group (Gunnison's, Utah, and white-tailed prairie dogs), black-tailed prairie dogs are by far the most numerous.

#### Black-tailed prairie dogs

Although black-tailed prairie dog populations have declined 98% from pre-Columbian lev-

NPS unit <sup>1</sup>	Park size <sup>2</sup> (acres)	Area occupied (acres)	Manage- ment Plan	Plague in Past 10 Years	Control Actions	Comments
Black-tailed pra	irie dog	-				
Badlands NP, S.Dak. • Map ID #1 <sup>3</sup>	232,822	7,131'	Yes	No, but near park	Live trapping, zinc phosphide	Complaints from neighbors. Plague documented near park in 2008 so park dusted one large colony. Park has ferrets.
Bent's Old Fort NHS, Colo. • Map ID #2	736	49	Yes	Yes	Live trapping, gas cartridges	Has a history of plague and dusting to control plague.
Devils Tower NM, Wyo. • Map ID #3	1,347	42	No	No	Live trapping, visual barriers, gas cartridges	A single isolated colony. Occasional encroachment into campground and visitor areas.
Fort Larned NHS, Kans. • Map ID #4	680	.33	No	No	Rozol	Prairie dog burrows located in historic trail ruts generating concerns from cultural resources. Complaints from neighbors.
Little Bighorn Battlefield NHS, Mont. • Map ID #5	765	<1	No	Unknown	No	Prairie dog colony adjacent to park. Only occasional occurrences of animals in the park.
Sand Creek Massacre NHS, Colo. • Map ID #6	2,400	120	In preparation	Yes	No	Park was recently established.
Scotts Bluff NM, Nebr. • Map ID #7	2,952	59	No	No	No	Park abuts urban area. One colony died out in 2008, another decreased in size and abundance, the other appears stable.

**Table 1**Status of prairie dogs in National Park Service units as of 2009. Occupied acres, status of<br/>plans, control actions, and comments provided by park staff.

NPS unit <sup>1</sup>	Park size <sup>2</sup> (acres)	Area occupied (acres)	Manage- ment Plan	Plague in Past 10 Years	Control Actions	Comments
Theodore Roosevelt NP, N.Dak. • Map ID #8	69,702	1,880	In preparation	No	Lethal trapping, barriers	Plague detections in 1986 and 1993. Suspicious colony die-off detected in 2005. Plague recently detected in mountain lions. Potential ferret reintroduction site.
Wind Cave NP, S.Dak. • Map ID #9	28,295	2,800	Yes	No, but near park	Live trapping, zinc phosphide, shooting	Some complaints from neighbors. Although plague not detected, park proactively dusted 1,100 acres in 2008 in part to protect a reintroduced black- footed ferret population.
Gunnison's prain	rie dog					
Chaco Culture NHP, N.Mex. • Map ID #10	32,840	80	No	Na	No	No management issues reported, but lack of staff makes it not feasible to monitor population.
Curecanti NRA, Colo. • Map ID #11	41,971	36	Yes, but dated 1982	Yes	Live-trapping, barriers, zinc phosphide	History of periodic plague events. Some colonies close to visitor areas. Site may be designated by state as Management Emphasis Area.
El Malpais NM, N.Mex. • Map ID #12	109,612	85	No	No	No	No issues reported.
El Morro NM, N.Mex. • Map ID #13	1,040	3	No	No	No	No issues reported.

Table 1 (cont'd)Status of prairie dogs in National Park Service units as of 2009. Occupied acres,status of plans, control actions, and comments provided by park staff.

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NPS unit <sup>1</sup>	Park size <sup>2</sup> (acres)	Area occupied (acres)	Manage- ment Plan	Plague in Past 10 Years	Control Actions	Comments
Florissant Fossil Beds NM <sup>5</sup> , Colo. • Map ID #14	5,992	ĩ	No	Yes	No	Plague in 2008 reduced population from 3 acres to 1 acre.
Great Sand Dunes NPP, Colo. • Map ID #15	85,932	<3	No	Unknown	No	On-going land exchange would add a few acres of habitat.
Hubbell Trading Post NHS, Ariz. • Map ID #16	160	10	No	No	Shoveling	Prairie dogs considered a "nuisance." Impact historic landscape and agricultural efforts.
Mesa Verde NP, Colo. • Map ID #17	52,216	3	No	Yes	Repellent	Were more abundant in the past.
Petrified Forest NP, Ariz, • Map ID #18	109,002	100+	No, but pursing funding	Yes	No	Plague outbreaks have killed off most colonies. Person got plague from handling a dead prairie dog. Acreage estimate is a guess, i.e., no surveys conducted.
Utah prairie dog				·,		
Bryce Canyon NP, Utah • Map ID #19	35,833	290	No, but in preparation	Yes	Barriers	Species is listed as threatened. Periodic plague outbreaks. Dust towns as needed.
White-tailed prac	írie dog					
Dinosaur NM, Colo./Utah • Map ID #20	203,031	1,700	No	Yes	No	History of plague. Ferret reintroduction site near the park.

Table 1 (cont'd)Status of prairie dogs in National Park Service units as of 2009. Occupied acres,status of plans, control actions, and comments provided by park staff.

NPS unit <sup>1</sup>	Park size <sup>2</sup> (acres)	Area occupied (acres)	Manage- ment Plan	Plague in Past 10 Years	Control Actions	Comments
Fossil Butte NM, Wyo. • Map ID #21	8,198	150	No	No	No	No management issues.

<sup>1</sup>NP=National Park, NM=National Monument, NHS=National Historic Site, NRA=National Recreation Area, NPP=National Park and Preserve.

<sup>2</sup> Acres consist only of federal acres within park boundary.

<sup>3</sup> ID number corresponds to location on Figure 1.

<sup>4</sup> Prairie dog acreage excludes the South Unit of the park, which is within the Pine Ridge Indian Reservation.

<sup>b</sup> The species in Florissant Fossil Beds NM was identified as white-tailed prairie dogs in Ulrich and Lee (1992).

 Table 1 (cont'd)
 Status of prairie dogs in National Park Service units as of 2009. Occupied acres, status of plans, control actions, and comments provided by park staff.

els, the species still occupies about 1.89 million acres across its range (USFWS 2004). We found that there are 12,115 acres of black-tailed prairie dog colonies on NPS lands, or less than 1% of the range-wide acreage occupied by the species. The NPS population comprises about 11% of the population on federal lands (see Sidle et al. 2006). About 98% of the acreage occupied by black-tailed prairie dogs on NPS lands are at just three units: Badlands, Theodore Roosevelt, and Wind Cave; the other six units with the species all have 120 or fewer acres. Two of the units, Sand Creek Massacre and Bent's Old Fort national historic sites, are well within the zone where sylvatic plague (referred to as bubonic plague when humans contract the disease) has been documented. Theodore Roosevelt is outside of the established plague zone; however, the disease was documented at the park in 1986 and 1993. In 2008, plague was documented just a few miles from Badlands.

Knowles et al. (2002) estimated that the black-tailed prairie dog may have naturally occupied up to 15% of the suitable habitat in the northern Great Plains. Considering the imperiled status of the species, it seems reasonable that parks with black-tailed prairie dogs should strive for at least that percentage, and most appear to be at or above that level. For example, the 2,800 acres of prairie dog colonies at Wind Cave occupy 33% of the suitable habitat for the species (National Park Service 2006a). Other parks are close to the 15% level; at Badlands, for example, prairie dogs occupy 11% of the suitable habitat (National Park Service 2007). Unfortunately, even the large parks within the range of the species contain a very low percentage of "suitable" prairie dog habitat as much of the land comprises forests, badlands topography, or otherwise unsuitable terrain.

Guadalupe Mountains National Park does not currently have black-tailed prairie dogs, but did attempt to reintroduce the species during the period 1998–2000; however, the effort was unsuccessful, perhaps due to predation. The park is interested in trying again with a larger effort; however, lack of resources is hampering the project. Several other parks without black-tailed prairie dogs appear to have suitable habitat, but no reintroductions are currently underway.

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#### The white-tail group: Gunnison's, Utah, and white-tailed prairie dogs

There are at least nine parks with Gunnison's prairie dogs, two with white-tailed prairie dogs, and one (Bryce Canyon) with the Utah prairie dog (Table 1). Other parks may also have small populations, but the large size and remoteness of some parks and the more secretive nature of the white-tailed group makes confirmation difficult. The 1,700 acres of white-tailed prairie dog colonies at Dinosaur National Monument are by far the largest population. Bryce Canyon supports 290 acres of colonies of the threatened Utah prairie dog. The Gunnison's prairie dog is currently listed as a candidate species within Colorado and New Mexico, further elevating its conservation status (USFWS 2008a).

Capitol Reef National Park introduced Utah prairie dogs in 1979, but the population winked out after only a few years (Player and Urness 1982). The park now questions whether the species is native to the site. Other parks, such as Canyonlands National Park and Colorado National Monument, appear to have had prairie dogs historically, but they are now absent. Aztec Ruins National Monument had Gunnison's prairie dogs until recently, but a plague epizootic eliminated the population.

#### Management of prairie dogs by the National Park Service

NPS's Species of Management Concern (SOMC) database attempts to catalogue all species of management concern in NPS units (excluding species listed under the ESA). The data are entered by park staff and therefore constitute a survey of park perceptions of prairie dogs. Eight of the nine parks with black-tailed prairie dogs responded to the call for data; all eight identified black-tailed prairie dogs as an SOMC. Of the 11 parks with Gunnison's or whitetailed prairie dogs, five parks listed prairie dogs as an SOMC while the other six did not. In addition, three parks where the species were extirpated listed them as an SOMC.

In early 2009 we sent out a questionnaire to all parks with prairie dogs asking them to rate prairie dogs as a management concern on a scale of "very low," "low," "moderate," "high," or "very high." We converted the responses to numerical scores from 1 to 5 with a 1 being "very low" and 5 being "very high." The mean response for the nine parks with blacktailed prairie dogs was 4.6, i.e., they judged the black-tailed prairie dog as a species of very high management concern. The mean response for the 11 parks that responded from the white-tailed group was 3.1, or "moderate," significantly lower than the responses for the black-tailed group (P<.001). The parks were also asked to use the same measures to rate the levels of complaints they get from neighbors, visitors, and others regarding prairie dogs. The nine parks with black-tailed prairie dogs scored a mean of 3.2, or a moderate level of complaints, whereas the respondents from the white-tailed group had a mean response of 1.8, or "low," also a significant difference (P<.05). The parks were also asked to report on the number of person-days spent annually on prairie dog management (field work, planning, meetings, outreach, etc., where prairie dogs were the primary emphasis). The nine parks with black-tailed prairie dogs spent an estimated 1,281 person-days annually, or a mean of 142 person-days per park, whereas the 11 parks that supported the white-tailed group spent an estimated 198 person-days annually, or a mean of 17 person-days per park, a significant difference (P<.05). Interestingly, three parks with black-tailed prairie dogs responded that they spent over 250 person-days annually, which is the equivalent of more than one employee working on the issue full-time.

We believe that prairie dogs are generally of high management concern to NPS units because: (1) their populations have substantially declined from historical levels; (2) they continue to be persecuted on private and public lands; (3) they are a keystone species (especially black-tailed prairie dogs); (4) they are impacted by plague (an exotic disease), which is also a risk to human health; (5) some species are currently listed, or proposed to be listed, under the ESA; (6) they can cause conflicts with other park objectives; and (7) they are often perceived as pests by neighbors and other agencies. The primary NPS activities related to prairie dog management can be categorized as planning, control activities, plague management, monitoring, research, and outreach. We discuss these activities here in more detail.

NPS units typically write species-specific management plans for only the most contentious or significant species. Therefore, it is not surprising that five of the nine parks with black-tailed prairie dogs have or are developing management plans specific to the species. In contrast, only two parks from the white-tailed group have prairie dog management plans: Bryce Canyon for the federally listed Utah prairie dog and Curecanti National Recreation Area for the Gunnison's prairie dog (however, that plan is from 1982 and viewed by park staff as being outdated).

NPS policy calls for restoring native species to natural conditions (e.g., with respect to abundances and distribution) and for allowing natural processes to continue unfettered by human intervention (National Park Service 2006b). However, agency policies also allow for intervention and control under certain circumstances and, when necessary, lethal removal. Paradoxically, according to NPS policies a species such as the prairie dog can simultaneously be defined and managed as a species of conservation concern and a pest. Perhaps more than any other species the prairie dog finds itself in this Jekyll-and-Hyde dichotomy. The justification for controlling prairie dogs on NPS units is often distilled down to one of three reasons: (1) human safety, (2) reducing conflicts with other park objectives (e.g., cultural resources), and (3) "good neighbor" purposes (Soukup 1999). Outside interests often try to influence prairie dog management within parks. For example, Kansas and South Dakota have laws requiring control of prairie dogs by property owners. The states have tried to impose these regulations on NPS; however, the agency asserts jurisdiction of wildlife within NPS units (Buono 1997). Ironically, at least one NPS unit with prairie dogs has been pressured to control their prairie dogs by a neighboring state-operated wildlife management area.

There are a variety of tools available for prairie dog management (Hygnstrom and Virchow 1994). Most parks prefer to use non-lethal tools such as habitat manipulation, fencing/barriers, and live capture and relocation. In some cases live-trapped animals have been transported to the Black-footed Ferret Conservation Center (Fort Collins, Colorado) for use by that program in rearing ferrets. Poisoning and shooting are viewed as tools of last resort. Zinc phosphide mixed with oats is the most commonly used poison. Although it requires pre-baiting to be most effective, the poison is efficient and appears to have few effects on nontarget species when properly applied (Witmer and Fagerstone 2003). At least one NPS unit has used the anticoagulant chlorophacinone (sold under the trade name Rozol) since the year 2000, a much more controversial rodenticide due to potential impacts on non-target species (Erickson and Urban 2004; Nesler 2006). However, a 2008 memo from the NPS Midwest regional director placed a moratorium on the use of that rodenticide (Quintana 2008).

Habitat management in the form of grazing or trampling (by various species, most commonly bovines) can be used in some cases to influence prairie dog distribution and abundance. For example, lighter grazing levels lessen the likelihood of prairie dog expansion. Conversely, heavy grazing or trampling creates conditions conducive to prairie dog establishment (Licht and Sanchez 1993). In at least one case, park management inadvertently created conditions conducive for prairie dog establishment. A northern Great Plains park mowed a campground located adjacent to a prairie dog town, thereby creating conditions favorable for colonization. The result was prairie dogs and prairie dog holes in the campground. Incidents such as these can be avoided with a better understanding of prairie dog ecology. Unfortunately, many smaller park units do not have natural resource programs, and therefore prairie dog management is a collateral duty for non-natural resource staff who may have limited scientific understanding of prairie dogs.

Plague has been, and will likely continue to be, a challenge for park managers for the foreseeable future (Aguirre et al. 1993). At least eight NPS units with prairie dogs have experienced plague in the past ten years and even parks with no evidence of the disease can be impacted. For example, in 2008 both Badlands and Wind Cave invested considerable resources to prophylactically treat prairie dog towns for plague even though the disease was not documented there. Plague is a high-profile issue because (1) it can decimate prairie dog colonies, (2) it can directly or indirectly affect other wildlife species such as black-footed ferrets, and (3) it poses a risk to human health. The plague bacterium (*Yersina pestis*) is exotic to North America, probably having arrived via San Francisco at the beginning of the twentieth century (see Cully et al. 2006). Therefore, there is no dispute that plague should be eliminated from NPS units. However, the most common way to control plague is to "dust" prairie dog burrows with the insecticide deltamethrin to kill fleas, a host of the plague bacterium (Seery et al. 2003). Unfortunately, little is known about the non-target impacts of the insecticide on tiger salamanders (*Ambystoma tigrinum*) and other species that reside in prairie dog burrows.

A prerequisite for a defensible prairie dog management program is the implementation of a rigorous monitoring program. Every park with black-tailed prairie dogs monitors the acreage occupied by the species; however, the frequency of the monitoring ranges from annual to periodic. Systematic annual monitoring becomes problematic at large parks due to logistical reasons (e.g., Badlands, Theodore Roosevelt, and Wind Cave); but may become more feasible in the future using remote imagery and GIS. With the exception of the federally listed Utah prairie dog at Bryce Canyon, the white-tailed group is monitored much less, if at all.

Although the agency's efforts at long-term monitoring of prairie dogs are spotty, NPS has a rich history of hosting short-term research. Koford's 1958 publication notwithstanding, the most important publication on prairie dog ecology was a book by John Hoogland based on a 16-year study at Wind Cave (Hoogland 1995). Other notable prairie dog research



Figure 2 The black-tailed prairie dog, Cynomys Iudovicianus. Photos courtesy of Daniel S. Licht.

at the park investigated social behavior and population dynamics (King 1955), the effects on above-ground biomass and nutrient dynamics (Krueger 1986), habitat use and spatial distribution (Wydeven and Dahlgren 1985), influence on grassland processes (Whicker and Detling 1993), ontogeny of behaviors (Loughry and Lazari 1994), ecosystem-level effects (Detling 1998), and population genetics (Dobson et al. 1998). Wind Cave, Badlands, Bryce Canyon, and Theodore Roosevelt have the richest research histories based on the NPS Nature-Bib database. We believe that long-term monitoring and studies of prairie dogs should be a high priority. Consider that black-tailed prairie dog populations, under natural conditions, are almost certainly cyclical. They are known to expand in drought periods and appear to contract in wet periods, cycles that could take decades. Yet there are no good long-term datasets uncompromised by control actions (e.g., poisoning, shooting) in which to test, analyze, and document these patterns. NPS units are well suited to provide this long-term information, providing they can leave populations unfettered.

NPS may be in a better position than any other agency to promote and educate the public about prairie dogs. The parks with resident black-tailed prairie dog populations hosted 2.4 million visitors in 2007 (http://www.nature.nps.gov/stats/index.cfm; the figure excludes Sand Creek Massacre National Historic Site for which visitation data are not available). At Devils Tower, the prairie dog is second only to the tower itself in terms of visitor attention (Jim Cheatham, pers. comm.). However, the flip side is that some visitors have preconceived negative ideas about prairie dogs, requiring innovative efforts by park interpretive programs to explain the benefits of the species. In some cases, the education and interpretation of prairie dogs needs to begin within the agency, as some park staff do not fully understand prairie dog ecology and may have inherent negative biases.

#### Conclusion

To paraphrase Charles Dickens, prairie dogs are one of the most loved species in NPS units and one of the most reviled. The NPS mission includes preserving prairie dogs for future generations; however, the agency's track record has been mixed. On the one hand there's the 100-year-old prairie dog colony at Devils Tower (Koford 1958); on the other, there are parks where the species has been extirpated. The environmental group Forest Guardians gave NPS a "B" grade for its conservation of prairie dogs—as good as or better than all other federal and state agencies, but not perfect (McCain 2009).

Prairie dog management will likely continue to confound park managers for the foreseeable future. Paradoxically, the agency oftentimes finds itself having to kill prairie dogs to appease neighbors in the belief that by doing so the park will be better able to conserve prairie dogs. So challenging is prairie dog management that parks sometimes find themselves investing considerable funds and time to protect prairie dogs (e.g., treating burrows with deltamethrin to prevent plague) in the same year that they invest considerable funds and time to control prairie dogs (e.g., killing prairie dogs with zinc phosphide), as was the case at Wind Cave in 2008.

Perception and personal values play a significant but poorly studied role in prairie dog management. For example, black-tailed prairie dogs can create relatively denuded areas pre-

dominately comprising forbs or bare ground. These areas are often viewed as unhealthy by neighbors, visitors, politicians, and even park staff, who have been taught for decades that heavy grazing is bad. However, such conditions are often within the range of natural variation and provide habitat for some species of wildlife, including species of conservation concern. Likewise, vegetation managers often blame prairie dogs for the spread of exotic plants and argue for prairie dog poisoning, yet the prairie dog is a native species, and therefore management efforts should focus on removing the exotic plants, not the prairie dog. Another problem of perception is that prairie dog populations often fluctuate in accordance with wet and dry cycles that can last for decades, yet park managers and decision-makers are often at a park for only a few years, which can lead to a lack of understanding of the process, overreacting to current conditions, and mismanagement of the resource.

Articulating and defending the ecological and keystone role of prairie dogs—and the NPS policies of natural conditions and processes—continues to be a challenge for park managers. Perhaps in the big picture the most important thing NPS can do for prairie dog conservation is to increase our understanding of the species' ecology and provide opportunities for the public to enjoy and appreciate the prairie dog ecosystem.

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# Civil Society and Protected Areas: Lessons from Canada's Experience

# Harvey Locke

How can a Minister stand up against the pressures of commercial interests who want to use the parks for mining, forestry, for every kind of honky-tonk recreational device known to man, unless the people who love these parks are prepared to band together and support the minister by getting the facts out across the country?

- Honourable Alvin Hamilton, Hansard\* 1960

#### Introduction

**PROTECTED AREAS, ESPECIALLY NATIONAL PARKS, ARE A HIGHLY VALUED COMPONENT** of Canadian life. They are of critical importance to the survival of many species of wildlife and to the provision of ecosystem services, including freshwater production and carbon sequestration. Civil society is the owner of those protected areas.

The term "civil society" is a way of referring to the public when it acts as individual citizens or through nongovernmental organizations for public-spirited reasons, and is distinct from other social groupings such as government, business, or family. (It does not include aboriginal groups, who are a form of government.)

Contrary to recent conventional academic wisdom, the origin and development of Canada's parks and protected areas lies not in business interests or the doctrine of commercial usefulness, but rather in the interests of civil society. Indeed, it is the special innovation of protected areas in North America (and Australia, New Zealand, and South Africa), starting in the 19th century, that they are dedicated to the public.

Civil society's engagement, or lack of it, has been and will likely continue to be *the* determining factor in the success of protected areas in Canada. History has shown that when civil society practices absentee ownership, the result is the destruction or disappearance of protected areas, and that when civil society leaves new protected area establishment exclusively to government, little gets done. The periods of public engagement in Canada's protected

<sup>\*</sup> *Hansard* is the familiar name of the *Official Report of Debates* of the Canadian parliament. It is named after Thomas Hansard, the publisher of the report of debates in the English parliament in the early 19th century.

areas have led to the creation of some of the world's most emblematic national parks and several world-class protected areas systems. Yet there is much more that needs to be done to respond to the grave environmental conditions we have created for ourselves in the 21st century. We should be protecting at least half of Canada's lands and waters in interconnected protected areas in order to do our share to keep intact the Earth and the natural systems we all depend on.

# Principles for civil society and protected areas

This paper will elaborate the following four principles, which can serve as a guide for considering the role of civil society in protected areas:

- Civil society is now—and always has been—the owner and primary beneficiary of parks and most protected areas, not just a stakeholder.
- When civil society is engaged, parks and protected areas thrive and new ones are created.
- When civil society is disengaged, bad things happen to parks and protected areas.
- To face 21st-century challenges, civil society should promote an expanded public agenda based on a major role for parks and protected areas that results in protection from industrial exploitation of at least half of Canada's public lands and waters in a system of interconnected protected areas.

# Civil society is the owner of protected areas

A critically important but often overlooked point about Canada's parks and protected areas is that they are owned by and dedicated to civil society. Civil society is not just another stakeholder, or a claimant under a government program, or a competing interest group. Civil society is *the* primary beneficiary of protected areas and thus the most important group. Indeed, from the beginning our protected areas have been dedicated to the public through the passage of public statutes.

# The civil society basis of Canadian protected areas

The most widely known system of protected areas in Canada is that of the national parks. The Parks Canada Agency was started in 1911 as a department of the Ministry of the Interior when its first commissioner, J.B. Harkin, a former journalist, was appointed. This makes it the oldest national parks agency in the world. Harkin felt that one of his first duties was to determine what parks were about. In notes that were later assembled by his long-time secretary Mabel Williams into *The History and Meaning of the National Parks of Canada*, he recounts that he looked to the world's first national park, Yellowstone (established in 1872 by an act of the US Congress), as the guiding inspiration for both the Canadian national park idea and management objectives. He noted the key role civil society played in Yellowstone's creation through "a continent-wide campaign" which "breathe[d] the true spirit of democ-

racy." To Harkin, the effect of creating this first national park was significant, for it represented "a new Declaration of Rights—the right of the people to share in the use and enjoyment of the noblest regions in their own land, another great expression of the principle of Conservation—the duty of [a] nation to guard its treasures of art, natural beauty, or natural wonders for generations to come."

In 1930, Harkin and others were able to get this declaration of rights and the principle of conservation enshrined in Canada's National Parks Act. It states that "the national parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to this Act and the regulations, and the parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations." This dedication clause is similarly worded to the key clause in the US National Park Service Act, passed in 1916.

Canada now has one of the better-run national park agencies in the world. It is governed by the 1998 Parks Canada Agency Act, a complement to Canada's National Parks Act, which provides that it is in the "national interest" to protect national parks and national marine conservation areas "in view of their special role in the lives of Canadians and the fabric of the nation." The Parks Canada Agency Act also contains a provision that enshrines a degree of ministerial accountability to civil society for the management of our parks through the requirement to convene a biannual roundtable gathering of knowledgeable persons.

Much of Canada's public land is under control of the provinces, some of which have created parks for the public benefit using legislative language that incorporates the civil society spirit of the national park dedication clause. For example, Ontario's Provincial Parks and Conservation Reserves Act states that "Ontario's provincial parks and conservation reserves are dedicated to the people of Ontario and visitors for their inspiration, education, health, recreational enjoyment and other benefits with the intention that these areas shall be managed to maintain their ecological integrity and to leave them unimpaired for future generations." Alberta's Willmore Wilderness Park Act says, "The Park is dedicated to the use of the people of Alberta for their benefit, education and enjoyment, subject to this Act and the regulations, and shall, by the management, conservation and protection of its natural resources and by the preservation of its natural beauty, be maintained for the enjoyment of future generations."

In the last 40 years, a new form of protected area has emerged that is entirely embedded within civil society. Land trusts, which are civil society actors created by private individuals and supported by special treatment under the tax system, are now buying land for conservation reasons. These land trusts often seek public funds for their activities, sometimes by justifying their activities as a necessary adjunct to buffer or link governmentally run protected areas. Examples are The Nature Conservancy of Canada's Waterton Front Project and Prime Minister Stephen Harper's 2007 announcement of CDN\$225 million in funding to land trusts for connectivity between protected areas (Harper 2008).

Civil society works on an international level as well, and some of the most exceptional protected areas in our country have been designated as World Heritage sites under the Convention Concerning the Protection of the World Cultural and Natural Heritage, familiarly known as the World Heritage Convention. It is "a convention establishing an effective system of collective protection of the cultural and natural heritage of outstanding universal value, organized on a permanent basis and in accordance with modern scientific methods." As a signatory to this treaty, Canada "recognizes ... the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage." The beneficiary of this duty is international civil society.

In sum, protected areas are a public good often explicitly dedicated by law to the current citizenry and to future citizens yet unborn. Governments hold them in trust for civil society.

## The "doctrine of usefulness" and it variants: The alleged commercial origin of Canada's national parks

Most Canadians believe that parks are created to protect wilderness and wildlife and to allow our enjoyment of protected nature. But historians and other park experts have often taken pains to say that that is not their origin (Hart 2005). Frequently they refer to the Canadian Pacific Railway's desire to build its tourism business, and to the "doctrine of usefulness" propounded by Robert Craig Brown in a paper presented at an influential 1968 conference titled "The Canadian National Parks: Today and Tomorrow" (Nelson and Scace 1969). In the paper, Brown asserted that "the original parks policy of Canada was not a departure from but rather a continuation of the [existing] general resource policy" of the government, which was to view natural resources exclusively in terms of their material utility to people (Brown 1969:97). The doctrine of usefulness has been accepted uncritically to the detriment of a full understanding of park history (MacEachern 2001).

The commercial doctrine of usefulness argument is usually buttressed with two quotes. First, from Sir John A. Macdonald, Canada's first prime minister, who said that Banff is "a spot ... which promises ... not only large pecuniary advantage to the Dominion, but much prestige.... It has all the qualifications to make it a place of great resort.... This section of the country should be brought at once into usefulness, that people should be encouraged to come there, that hotels should be built" (*Hansard* 1887). The second quote often referred to is by William Cornelius Van Horne, the president of the Canadian Pacific Railway, who said around the same time: "If we can't export the scenery, we'll import the tourists."

Similarly, perhaps due to a fit of nationalism, it is also sometimes asserted that the US experience of Yellowstone has nothing to do with Canadian park history, which begins with a 10-square-mile reserve around the Cave and Basin Hot Springs at Banff in 1885. The argument goes that the unsightly development of thermal pools at Hot Springs, Arkansas (which was established as a public reservation beginning in 1832, and later became as US national park), was the inspiration for Banff National Park because there was a desire to show we could do a better job. Brown wrote: "The park was clearly intended to be a showpiece for Canada, deliberately modeled to be superior in planning and execution to the Hot Springs in Arkansas" (Brown 1969).

These views have been woven into the idea that, in their origins, our parks were "islands of development in a sea of wilderness" that were set up at the urgings of railways and designed to make profits for the private interests in the tourist industry. This perspective is repeated in the fixed interpretive exhibits found in Parks Canada's Cave and Basin Centennial Centre in Banff National Park, as well as the film that is shown there, titled *Steam, Schemes and National Dreams* (which have been in place for about 15 years). Brown's thesis also has been embraced, directly or indirectly, by many writers who are authorities on our parks.

It is time to adjust this view. These received truths are unfortunate and largely inaccurate views of Canadian park history. They serve to downplay the primacy of civil society interests in our parks and protected areas and they have been used to legitimate the demands of commercial interests at the expense of the public by suggesting that commercial interests have some antecedent claim to the parks. The nationalistic narrative also completely misses the fact that Canada was a participant in a late-nineteenth-century effort across the Englishspeaking world to protect wild nature and wildlife in parks.

#### The real origins of Canada's national parks

It is my contention that Canada's national parks system either begins with the Rocky Mountains Park Act of 1887 or the Order in Council (an administrative decision that originates in the federal cabinet) reserving four areas for parks in 1885, not just the Order in Council relating to the Cave and Basin Hot Springs on November 12, 1885, as is usually maintained. The exclusive focus in our park histories on the Banff hot springs has confused the record. That reserve was only protected by an Order in Council for a period of two years, and there were other areas reserved by the same method *earlier* that same year. The annual report of the Department of the Interior for 1886 states the following under the heading "Park Reservations in the Rocky Mountains":

In addition to the reservations at Banff already alluded to, four mountain parks were reserved by Order in Council of the 10th of October last:—

- A park at Mount Stephen including the country surrounding the base of the mountain and adjacent picturesque points.

- A reservation in the vicinity of Mount Sir Donald, taking in the loop of the railway and adjacent territory.

A sufficient area in the Eagle Pass to include Griffin and Three Valley Lakes, and adjoining points of interest.

- The amphitheatre at the summit of the Selkirk Mountains.

These four areas did not have hot springs. And the 1886 Interior report mentions in the context of the Banff hot springs reservation that, in addition to receiving information about Arkansas' Hot Springs, "this Department was furnished with ... publications respecting the Yellowstone National Park, all of which have been found valuable and useful."

If one is willing to accept that an Order in Council is sufficient means to start our national park system, then it was the first Order in Council of October 10, 1885, that did it. And it is clear that these reservations were not set up to spend money so as to bring them into "usefulness." In response to criticism about public investment in infrastructure in the Banff area during the Rocky Mountains Park Act debate, Minster of the Interior Thomas White said:

That is not the only park that we have ventured by Order in Council to reserve. We have reserved others, but have made no expenditure on them, for the simple reason that they required no expenditure to bring them into use.... We had no less than four forest reservations throughout the mountains, and my impression is that they will prove advantageous not simply as large groves of fine forest trees in parks of which we all ought to be proud, but they will be of advantage to the country in regards to its salubrity... (*Hansard* 1887).

The real discussion about the purpose of our first national park begins with the establishment of Rocky Mountains National Park in 1887. A review of the *Hansard* record of the debate shows several references by several speakers to Yellowstone and few references by few speakers to Hot Springs, Arkansas. The latter references are usually confined to the narrow context of spending decisions. The inspiration of Yellowstone is demonstrated in two telling quotes:

Mr. Trow: "The Minister of the Interior has just stated that he thinks I was the individual who first drew the attention of the Government to the advisability of reserving a portion of the territory near Banff for a public park..., I was not aware that I had much influence with [the] Minister but I stated the true facts of the case, and that it would be advisable to make of this place a park similar to the Yellowstone Park in Montana."

Mr. Allan (in committee): "We have the advantage of the example of our neighbours in the National Park they have laid out in the midst of the most beautiful scenery in the United States" (*Hansard* 1887).

The text of the 1887 Rocky Mountains Park Act itself confirms the proposition that it was Yellowstone that was the inspiration, and civil society the beneficiary, of our first national park. It provides at section 2 that the area be "reserved and set apart as a public park and pleasure ground for the benefit, advantage and enjoyment of the people of Canada" and was modeled on similar language in the Yellowstone Park Act. As Fergus Lothian wrote in the *History of the National Parks of Canada*, "Departmental officers had as a prototype Yellowstone National Park ... and there is every reason to believe that [this clause's] framers had recourse to the United Sates legislation" (Lothian 1976:26). Even the name of the park chose to emphasize the Rocky Mountains, not the hot springs, and the first park included Lake Minnewanka and the mountains around it, not just the hot springs and Banff townsite. The 1887 act also made explicit provision for the protection of the park's wildlife, which is not consistent with the park's being all about a hot spring spa.

It is also clear from the *Hansard* record of the 1887 debates that the public, not commercial interests, was to be the beneficiary of this new park inspired by Yellowstone. Here
are three illustrative quotes:

Mr. Hawthorn (in Committee, second reading): "I think this is an occasion on which we may offer our congratulations to the people of the Dominion upon the probability of their possessing quite a unique park... In this country we do not possess the material advantages that they have in older countries. We have no antiquities here except for our 'mountains hoar' and our 'ancient trees' and these things, left as nature has left them for us, are in their way, perhaps as great attractions as the ruins of Europe."

Mr. Kaulbach (in Committee, second reading): "I am glad to have the opportunity of thanking the government for reserving this piece of property for the public and for preventing it getting into the hands of speculators."

Mr. Casey: "I think everyone is agreed as to the advisability of reserving some portion of our vast domain near the Rocky Mountains for the purposes of a public pleasure ground."

The Canadian Pacific Railway certainly benefited, but the purpose of the park was public benefit, nature conservation, and national identity. Sir John A. Macdonald explicitly rejected privatizing the area by selling it to the railway, "who would only be too glad to take the land and make 1000 percent out of it" (*Hansard* 1887). The same day (May 3, 1887), Sir Donald Smith, who was deeply involved in the Canadian Pacific Railway, said: "Anyone who has gone to Banff, and from the plateau on which the hotel is to be built, has looked down on the fall immediately below . . . who has looked on the reaches of the Bow River, and, on turning round beheld the mountains towering heavenward, and not felt himself elevated and proud that all this is part of the Dominion cannot be a true Canadian."

This not to deny that Rocky Mountains Park did include hot springs and a townsite that were to be developed, and that these were seen as very important actions in the park (Figure 1). But any doubt regarding the conservation and public-spirited motivations for our early national park *system* is immediately set to rest by examining the other park creation efforts that were concurrent with or immediately followed the creation of Rocky Mountains National Park. Brown and others who advance the hot springs-centered view of our park history simply ignore these.

### Most of the earliest parks were created or expanded at the urging of civil society

Though the reserve around the hot springs at Banff started out very small in 1885 at 10 square miles, by the time of the debates in 1887 Rocky Mountains National Park included not only the hot springs and the Banff townsite area but also the mountains nearby and Lake Minnewanka, for an area of 260 square miles. In the late 1890s, citizen advocates and administrators called for a further massive expansion of Rocky Mountains National Park. They compared Yellowstone's 3,000 square miles to Rocky Mountains' relatively small 260-



Figure 1 Contemporary view of Banff National Park, with Banff townsite. Photo courtesy of Harvey Locke.

square-mile area. In 1902, supported by editorials in Vancouver and Winnipeg newspapers, the federal government enlarged the park to 4,400 square miles by including Lake Louise and its surrounding area and the wilderness watersheds of the Upper Bow, Kananaskis, Red Deer, and Spray rivers (Lothian 1976).

Nor were Canada's other early parks intended to be "islands of civilization in a sea of wilderness," as has been asserted. They were areas dedicated to nature appreciation in the public interest. Yoho National Park (which began as Mount Stephen Reservation) and Glacier National Park in British Columbia (which began as reservations at Mount Sir Donald and the Amphitheatre at the summit of the Selkirk Mountains) both started small. Small reserves were also set up at Lake Louise in 1892 and Waterton in 1894. Eventually they all had hotels associated with railways. Though their small size, combined with the presence of some tourism development, might tend to support the "islands of civilization" theory, the fact is that these first parks did not stay small for very long. Civil society almost immediately insisted on their expansion to protect more of the mountains.

Glacier National Park was enlarged to 576 square miles in 1903 as "the Minister acceded to public demand that a larger area of outstanding scenery be set aside for public use" (Lothian 1976). Similarly, Yoho National Park was expanded from 10 square miles around a railway hotel to 828 square miles in 1901 (it is now 507 square miles).

Waterton Lakes National Park started out as the Kootenay Lakes Forest Park in 1895 and was created as a result of the civic activism of rancher L.W. Goodsal, John George "Kootenai" Brown, and other southern Albertans. There was no railway hotel involved until the 1920s. Initially only 10 square miles in size, the park was greatly enlarged after activists kept campaigning for a more meaningful size. Today it is 204 square miles (Lothian 1976). But the park is still incomplete because it lacks a large wilderness area. Unlike its adjoining US neighbor, Glacier National Park in Montana, it protects none of the magnificent and wildlife-rich wilderness of the Flathead Valley. Today this deficiency is the subject of an ongoing civil society conservation campaign to expand the park, called Flathead Wild (www.flathead.ca).

When Jasper National Park was established in 1908, the boundary left out key areas. The Alpine Club of Canada, a civil society organization, lobbied to have the park include important wilderness areas like the Columbia Icefield and Maligne Lake such that by 1914 it became 4,400 square miles in size (Lothian 1976). Jasper is 4,200 square miles today. Similarly, at the urging of the citizens of nearby Revelstoke, British Columbia, Mount Revelstoke National Park was created in 1915.

There were some anomalies other than the Banff hot springs that have been used to justify the doctrine of usefulness and it variations. There were coal mines at Bankhead in Rocky Mountains and Pocahontas in Jasper and a lead zinc mine at Cathedral Mountain in Yoho, and a few grandfathered-in logging operations. But these anomalies do not change the fact that these parks were set up with public support for the public interest, and they quickly grew to protect vast areas that remain to this day in a wilderness condition.

In addition to federal parks, important provincial parks were created in British Columbia around the same period for nature appreciation reasons: Strathcona, Mount Robson, Mount Assiniboine, and Mount Garibaldi. These parks continue to protect outstanding wilderness areas. The enormous Hamber Provincial Park was created on the British Columbia side of Banff and Jasper, creating a protected connection from them to Glacier National Park in the Selkirk Mountains, but, as we shall see, it suffered a different fate.

Brown was wrong when he said "the original parks policy of Canada was not a departure from but a continuation of the general resource policy that grew out of the expansionist, exploitive economic programs of the national policy of the MacDonald [sic] Government" (Brown 1969:97). His "doctrine of usefulness" more aptly applies to early "national" parks established in the 1890s by Ontario and Quebec, which are actually provincial parks despite the term "national" in their name (a confusing appellation that persists to this day in some cases). These include Algonquin National Park (Killan 1993) in Ontario and Tremblant and Laurentides national parks in Quebec (Hebert 1968). They were established to protect wildlife, support recreation, and promote wise use of the forest resources there (Tremblant also had a tuberculosis sanitarium as one of its purposes). These were more like the national forests in the United States that were set up beginning at the turn of the 20th century, where "wise use" of the forests was the original vision (Runte 1991), rather than federal national parks in Canada or the US that were set up in the same period.

Though there arguably was a national policy to develop the Canadian West as a whole grounded on a doctrine of usefulness, from the beginning there was also a separate and distinct national desire to protect the Rocky Mountains for the public in federal national parks just as the Americans had done at Yellowstone.

## Wildlife conservation in the public interest

From the beginning, a provision was made for wildlife conservation in the 1887 Rocky Mountains Park Act. Shortly after Canada's first parks were created, there was heightened public and government alarm at the disappearance of large mammals from North America. Canadian writers of international renown, such as Ernest Thompson Seton, raised awareness and argued for their protection. In the first quarter of the 20th century, Canada created Buffalo National Park for plains bison (abolished in 1939; see Brower 2008). In addition, Menissawok, Wawaskesy, and Nemiskam national parks were established in 1922 for pronghorn "antelope" but later abolished when it was felt pronghorn had sufficiently recovered (Lothian 1981). Wood Buffalo National Park and the giant Thelon Game Sanctuary, both created to protect animals and their habitats, still remain in place today and are among the world's largest protected areas. All this was about nature conservation, supported by public concern for wildlife (Hewitt 1921; Lothian 1976).

# Canada's first parks were part of a broader international context

The early Canadian federal park creation activities were part of a broader cultural trend in the English-speaking world. All over the British Empire and in the US, new parks were being created for the same reasons. South Africa established Kruger National Park in 1895 and Umfalozi Game Reserve and several other game reserves in 1897. Australia and New Zealand created national parks in the same period (Australia's Royal National Park predates Banff). The state of New York created Adirondack Park in 1892 to keep the land owned by the state "forever wild" and enshrined wilderness protection in the state constitution. The origins of Mount Rainer, Olympic, Grand Canyon, and Glacier national parks in the US were during this period. Game reserves were created in India in the 1920s (Stebbing 1920). Canada was at the vanguard of this international movement to protect nature in the interests of civil society with its great western mountain parks.

### The two on-going roles of civil society

There are always two fundamental issues with protected areas: whether they will be created and how they are managed after establishment. This can be analogized to automobile purchases, which involve buying the shiny new car and the vital "after-sales service" that will determine its performance. Civil society's engagement is the major determinant of outcomes relating to both issues.

"After-sales service" to ensure the integrity of parks is the most overlooked role for civil society, yet anyone deeply involved knows it is essential. J.B. Harkin wrote that "the battle for the establishment of national parks is long since over but the battle to keep them inviolate is never won. Claims for the violation of their sanctity are always being put forward under the plausible plea of national or local needs" (Harkin 1957; Figure 2). US President Jimmy Carter, who during his term doubled the size of the country's national park system, wrote

that "today and every day we must defend the parks against those who would despoil them" (Carter 2001).

The Alpine Club of Canada was the first civil society organization to concentrate on the creation and management of parks and made an enormous contribution to their well-being in the first half of the 20th century. Co-founder Elizabeth Parker wrote in 1907 that "the Alpine Club is a national trust for the defense of our mountain solitudes ... for the keeping free from the grind of commerce, the wooded passes and valleys and alplands of the wilderness. It is the people's right to have access to the remote places of safest retreat from the fever and the fret of the market place and the beaten tracks of life" (Reichwein 1998).

When control over natural resources was transferred from the federal government to Alberta in 1930, there was pressure to transfer all the land, including the national parks, to the province for economic development. The Alpine Club of Canada, working in concert with Parks Commissioner Harkin, mobilized to fight this. They created the Canada National Parks Association (CNPA), whose leadership included the legendary surveyor and longtime Alpine Club President A.O. Wheeler, and the conservationist Selby Walker of Calgary.

Evidence of their efforts can be seen in the record of *Hansard* during the debate in 1930 regarding the proposed deletion of significant areas from Rocky Mountains National Park in the area of Spray Lakes–Kananaskis and north and east of Lake Minnewanka, as well as a portion of Jasper National Park. These lands were argued to be "more suitable for industrial and commercial purposes than for national park purposes." Senator Foster noted there were objections: "There is a very lively and commendable interest on the part of the people of Canada in this matter of public parks. I have received twenty or thirty communications

**Figure 2** Title page of J.B. Harkin's history of the Canadian national parks. Photo courtesy of H.R. Larson Publishing Company.



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within the last fortnight ... calling attention to a rather general fear that the parks may be reduced in area for commercial purposes...." The objections failed to prevent the deletion of some lands, but they appear to have had an impact. In the Senate, a government representative, Mr. Graham, noted that things could have been much worse: "A considerable area is being taken form the parks, but it must be remembered, —and again I am not telling tales out of school—that the provinces were eager to have the entire park area.... That was discussed time and again but the Dominion Government would not agree to go so far."

Unfortunately, little remains of the CNPA's history and the organization has been largely forgotten, though there are some efforts to gather newsletters and do other research (P. Reichwein, pers. comm., 2008). The author once tried to locate the papers of this organization. He met with Mary Lynas (née Selby), who was the organization's secretary and daughter of key member Selby Walker. He was told that "Mum hated the amount of time Dad spent on the CNPA so after Dad died she burned all the papers." The Inglewood Bird Sanctuary in Calgary is, however, a lasting record of Selby Walker's commitment to conservation. It was the family homestead, which he gave to the city.

# The dark period: World War II to 1960, when civil society went to sleep

The overwhelming magnitude of the Great Depression and World War II changed everything. These seismic events threatened the survival of individuals and society. Respect for and deference to government became the norm. Massive social mobilization in the war effort required authoritarian systems and yielded successful results. Scientific advances led to vast use of agricultural chemicals to increase soil productivity and crop yields. Post-war soldier resettlement, together with infrastructure programs, made society believe that big institutions were looking out for them. Canada embraced "scientific forestry" and perpetual sustained yield and trusted government and industry to deliver good management of our forests (Wilson 1998). Rivers were flooded across the country for hydropower. We built the Trans-Canada Highway.

The Canadian National Parks Association was a casualty of the war. And after the war was over, the Alpine Club of Canada shifted away from being a conservation organization to one that promoted road-building and greater tourism facilities. Reichwein described it this way: "The internal pendulum of the organization had swung from preservation to utilization as a new generation of Alpine Club men and women moved to the fore in the era of post-war expansion" (Reichwein 1998). No effective voice took the club's place to speak up for the parks.

# Absentee ownership results in vandalism in the 1950s and early 1960s

In the early years of parks and protected areas in Canada, the active presence of civil society in public discourse relating to protected areas resulted in both great leaps forward for our protected areas systems and a largely successful defense of existing parks. In the 1950s, the absence of an engaged civil society led to the parks' degradation and neglect. This took two forms. The first was a frontal assault. Whole protected areas were eliminated or greatly reduced in size. There are two dramatic examples. Hamber Provincial Park in British Columbia, whose boundaries extended from Jasper in the east to Glacier National Park in the west, was reduced to a tiny fragment abutting Jasper in order to accommodate logging and hydroelectric dam development on the Columbia River. The Mackenzie Mountains Reserve, which covered the Northwest Territories portion of that enormous mountain range, was abolished outright. The Nahanni watershed and many others were thus made open to development. The once enormous extent of these now-diminished or vanished protected areas can be seen in the 1950 edition of the *Atlas of Canada*.

To the extent that any attention was paid to parks it was primarily focused on developing infrastructure to accommodate automobile tourism instead of new park creation or wilderness and wildlife preservation (with an important exception relating to improvements in carnivore conservation in our national parks). The Trans-Canada Highway was built through the heart of four of our western national parks and Hamber Park. Canadian park officials looked with envy at the US National Park Service's Mission 66 infrastructure program and tried to emulate it. Parks Canada planners proposed building loop roads through the wilderness backcountry of Banff and Jasper, as had been done in Yellowstone.

#### The great reawakening of Canadian civil society in the 1960s

The *cri de coeur* from Alvin Hamilton, the minister responsible for national parks, quoted at the opening of this paper, finally awoke Canadian civil society from its long, neglectful slumber regarding protected areas. The idea of a citizen's organization to rise to the defense of parks was expressed at a 1962 Resources for Tomorrow conference of the Federal Provincial Parks Executive Association. In response, a group of people came together to create the National and Provincial Parks Association of Canada (NPPAC) in 1963. Today, it is called the Canadian Parks and Wilderness Society (CPAWS) or, in French, SNAP (La Société pour la nature et les parcs du Canada). That same decade the Canadian Audubon Society took on new life as the Canadian Nature Federation and World Wildlife Fund of Canada was organized in Toronto. Important provincial groups such as Ontario's Algonquin Wildlands League, the Sierra Club in British Columbia, and the Alberta Wilderness Association were established, as were local groups, such as the Bow Valley Naturalists.

NPPAC led the charge for protected areas on the national stage. It set as its first task the defense of the magnificent legacy of Canada's national parks. The minutes of the NPPAC board meeting of November 12, 1965, reveal the extent of the problem that had arisen while civil society slept: "Pressures on governments from industrial and professional associations to allow the extraction of so-called resources from the parks continue.... At its 1964 convention the Canadian Institute of Forestry passed a resolution urging the government of Canada to permit lumbering in the national parks on the grounds that the timber stands were going to waste. In June of that year the British Columbia Chamber of Commerce passed a resolution urging that mining be allowed in the national parks. Also that June, the Ontario Mining Association decided to embark on a campaign to try to convince the people of Ontario that mining in provincial parks would be good for the province.

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In the midst of these proposals, NPPAC found a symbolic issue of great importance. It took on an international fight to safeguard Banff National Park from the enormous impacts that would occur if the townsite were chosen to host the 1964 Winter Olympics, a proposal that was being pushed by the Calgary Olympic Association. It was an ugly and personal fight that NPPAC ultimately won.

This experience taught NPPAC's key members that confusion about the role and purpose of national parks was part of the problem. Working with the fledgling University of Calgary, in 1968 NPPAC helped organize the conference referred to earlier, titled "The Canadian National Parks: Today and Tomorrow" (Nelson and Scace 1969). This seminal conference set the forward ideological trajectory of parks in Canada for many years and was the University of Calgary's first major international conference.

The next fight involving civil society and national parks was even bigger. It revolved around a massive four-season resort to be called Village Lake Louise. The federal government had solicited Imperial Oil, a subsidiary of Exxon (known in the US and Canada at that time as "Esso"), the world's largest oil company, to build the resort. Here were corporate and government Goliaths. But there were civil society Davids, too.

The Calgary–Banff Chapter of NPPAC and the Banff-based Bow Valley Naturalists carried the fight in Alberta. Gavin Henderson of NPPAC led the national fight from Toronto, which included a "cut up your Esso credit card" campaign. Thousands of cut-up credit cards were mailed to the company's president. The combined effect of these actions to mobilize the Canadian public forced public hearings on a project thought by government (including Parks Canada; see Touche 1990) and Esso to be a *fait accompli*. Ultimately, the public outcry led to cancellation of the project by the federal government.

Civil society undertook similar defenses of parks and wilderness at the provincial level. The Wildlands League and others led a successful fight to ban logging from Quetico Wilderness Park in Ontario (Killan 1993). The Alberta Wilderness Association led efforts to protect the province's Eastern Slope. Citizens stood up to stop a huge mining project in Strathcona Provincial Park on Vancouver Island. In the 1970s there were also important new parks created in British Columbia, some of which is chronicled in Ric Careless' *To Save the Wild Earth* (1997). On the other hand, a disengaged public left Quebec and New Brunswick as provincial protected area "black holes" during most of the 20th century (with a few notable exceptions of parks created in the pre-World War II period).

In the early 1970s, NPPAC also sought new federal parks. It was particularly prominent in the creation of Kluane, Ayuittuq, and Nahanni national park reserves. The latter was the subject of a national campaign by NPPAC partly because the alternative to protecting the river was a hydroelectric dam at Virginia Falls. A well-publicized NPPAC field trip to Nahanni led by Jim Thorsell and a national speaking tour by George Scotter ignited the public interest. This activity corresponded with Jean Chrétien's arrival as minister responsible for national parks. In a celebrated five-dollar bet, NPPAC President Al Frame challenged Chrétien to create 10 new parks in his term. Chrétien created 12, including La Mauricie National Park in his own riding, and won the bet. Later, as prime minister, Chrétien continued this work. In 2002, he announced a national parks system expansion plan that would include ten new parks, five new marine protected areas, and the expansion of three existing parks, including Nahanni and Waterton. (He told the author that day that he still has the \$5 bill he won in the bet with NPPAC in the early 1970s.)

Prior to the great Village Lake Louise debate, parks decisions were made by Parks Canada staff and their political masters. The public was not engaged or consulted. The longerterm result of that fight was much more public engagement in national park decision-making. But the victory at Lake Louise began to look Pyrrhic in the 1980s.

#### The 1980s were mostly bleak

There were few successes for parks and protected areas in the 1980s, but they are worth noting. A massive national campaign by nongovernmental organizations (NGOs), teamed up with the courageous efforts of the Haida people, led to the creation of Gwaii Haanas National Park Reserve in the lush temperate rainforests of the Queen Charlotte Islands in British Columbia. A grassroots effort led to protection of the Valhalla Mountains and western shoreline of Slocan Lake and the Stein Valley, also in British Columbia. Grasslands National Park in Saskatchewan finally got off the ground. But massive clear-cut liquidation of old-growth forests and destruction of grasslands due to agricultural policies was more the norm than new parks like Gwaii Haanas or Grasslands. Drastic budget cuts in 1985 severely impaired the Canadian Wildlife Service (CWS), crippling that agency's ability to properly manage existing national wildlife areas and migratory bird sanctuaries and largely halting efforts to create new ones. This legacy of a damaged CWS is still with us today.

Though the National Parks Act was amended in 1988 to include legal designation of wilderness inside parks as development-free zones, to increase fines for poaching, and to make ecological integrity the first consideration in park management plans, these had little impact. For despite the success in the early 1970s, there was no final resolution of the commercial development debate in Banff National Park. Instead of single high-profile projects like the Olympics and Village Lake Louise proposals, throughout the 1980s there was a seemingly never-ending proliferation of new hotels and proposed ski hill and golf course expansions, and the town of Banff grew significantly, as did the Lake Louise service center.

The pace of development in Banff National Park amounted to half a billion dollars in commercial development over ten years; the Banff sewerage system was overwhelmed to the point where raw sewage was discharged into the Bow River. Federal tourism infrastructure subsidies were given out to encourage development. Big expansions were proposed at the Lake Louise and Sunshine Villager ski areas. One hotel owner said to the author that "you felt like a fool if you didn't get in on it." Wildlife biologists raised the alarm that the growth of the town of Banff and expansion of outlying developments, as well as the newly twinned highway in the Bow Valley, had created serious blockages to wildlife movements. The very purpose of the park was being forgotten. A giant three-story shopping mall with indoor parking, touting itself as "Banff's Great Indoors," was built with Parks Canada approval. Then planning authority was handed over to the newly created town of Banff. And though this transfer was explicitly not one that gave away final say, it did not stop the deputy mayor from asserting Banff's independence from the federal government and the national park of which it had always formed a part. Among the many comments he made was that "the whole of

Canada forever wants to mingle in our affairs.... Go to hell, this is Banff. We live here" (Hock and Sisco 1991). At Lake Louise a huge Korean church was proposed in order to attract tourists from that country. A hotel owner wrote to his guests to describe groups who wanted to stop all this development as "lunatics [who] want to turn Banff into a wildlife sanctuary." The Canadian Pacific Railway wanted to expand its golf courses in rare montane habitat, and new commercial projects were also proposed for Jasper and Waterton, thus risking the spread of commercialism. Variations of the doctrine of usefulness were used as a justification for this unprecedented surge in commercialization.

#### Civil society sets the agenda in the 1990s

It was obvious that fighting individual projects in this park environment was a fool's game. So in 1992, CPAWS launched a campaign to end commercial development in Banff National Park (Locke 1994). The campaign quickly ignited a national debate. Media (both French and English) covered the issue extensively. Notable were a feature-length report on Radio Canada TV's *Le point* and an above-the-fold Christmas Eve story in the *Globe and Mail* (a leading national newspaper) headlined "Banff's Outlook Not a Pretty Picture." CBC Television's *The Nature of Things with David Suzuki* did a feature program on our national parks with Banff at its center. A lawsuit was also launched regarding a last minute pre-election exemption of the Sunshine ski area's expansion proposal from the environmental assessment process (Locke and Elgie 1995).

The new Liberal government quickly responded by announcing the Banff–Bow Valley Study. This multi-year study assembled experts and competing interests and took stock of the state of affairs. It reached the conclusion that Banff was deeply compromised and that development not only had to be stopped but reversed in certain areas (Banff–Bow Valley Task Force 1996). Despite a fierce lobby from Canadian Pacific and the newly formed business and downhill skier lobby group called Association for Mountain Parks Protection and Enjoyment, Environment Minister Sheila Copps, backed by Prime Minister Chrétien, announced that the study would be accepted and major parts implemented (Copps 1997).

But the study did not cover the town of Banff and so a subsequent battle ensued. After a local plebiscite was held, the town council decided to vote itself the right to enact large amounts of further commercial development. A counter-vote by the Canadian public was organized by CPAWS at Mountain Equipment Co-op stores in several cities (Figure 3). Canadians from across the country voted to end commercial development in Banff in numbers that exceeded the votes cast in Banff. The result was a federal decision to end commercial development, the reduction of the town boundary, and an amendment to the National Parks Act to remove the capacity to create other towns inside national parks.

In the 1990s, civil society moved to the offensive on the new protected areas front too. At the international level, the publication of *Our Common Future* (1988), known also as the Brundtland Report on Sustainable Development, coincided with a major increase in public concern for the environment. It called for the worlds' protected area estate to be at least tripled from the existing level of 4% of the world's land area. This galvanized action in Can-

**Figure 3** Poster developed by CPAWS to encourage the Canadian public to vote to end commercial development in Banff National Park. Photo courtesy of Harvey Locke.

ada (Locke 1993). Largely spearheaded by the World Wildlife Fund in partnership with CPAWS, an Endangered Spaces Campaign was launched in 1989 with the express goal of moving from 2.95% of Canada in protected areas to at least 12% by 2000 (Hummel 1989). Over 600,000 people signed the Canadian Wilderness Charter, which supported the campaign's goals.

Results of the ten-year effort varied across the country, but the total protected areas estate in Canada more than doubled in 10 years from 2.95% to 6.84% (MacNamee 2008). Notable successes occurred in Manitoba, Nova Scotia, and, despite a discouraging start, Ontario. Some good results were



obtained in Alberta as well. A similar 12% goal was embraced by the Mike Harcourt provincial government in British Columbia, where a widespread and vigorous civil society movement existed that included the Sierra Club, the Western Canada Wilderness Committee, the Valhalla Wilderness Society, B.C. Spaces for Nature, the Outdoor Recreation Council of British Columbia, and CPAWS. British Columbia achieved its target of 12% protection during the decade. It is important to emphasize here that while governments did the job, it was the sustained push from civil society that resulted in doubling the amount of Canada that was protected in parks and other protected areas. Jean Chrétien, when he was minister responsible for parks in 1970, said it well:

We will need even more public support than we have if our parkland is to meet the needs of the future. It won't be enough for those concerned to be content with telling each other how they feel. Politicians must *know* that the public wants more parks. Those in government who control the purse strings must me persuaded that park needs are a real and vital priority.

# Moving from protecting "island parks" to large landscape conservation

The "12% at least" target was based on "representation," the idea that characteristic samples of all natural regions of the country should be preserved (Hummel 1989). But as the Endangered Spaces campaign was unfolding, the emerging science of conservation biology was convincingly demonstrating that island protected areas were not adequate to hold their ecological values through time. The facts were plain that 12% of the landscape is not enough to maintain ecological processes and viable populations of wide-ranging species. The target of 12% presented the risk of becoming a cap that would ensure conservation failure if protected area efforts stopped because of "over-representation."

Conservation biology gave rise to a civil society effort to conserve interconnected conservation areas at a North American scale led by The Wildlands Project, whose founders included notable conservation biologists. The Wildlands Project and CPAWS came together in 1993 with many scientists and other civil society groups to create the Yellowstone to Yukon (Y2Y) Conservation Initiative (www.y2y.net). Y2Y's goal is to enable nature to function at scale and allow species such as grizzly bears to flourish along with humanity over the long term by ensuring connectivity between the region's emblematic parks and wilderness areas and the creation of new parks, especially in the north (Locke 1994, 1997). Y2Y is a civil society-driven project that has drawn widespread support from NGOs and philanthropies and attracted international attention (Chester 2006; Worboys et al., in press). The Y2Y idea helped to inspire the creation of the Muskwa-Kechika Management Area in British Columbia's Northern Rockies in the late 1990s. Covering 6.3 million hectares, the management area is mix of new wilderness parks embedded in a matrix of special management zones intended to protect wilderness and wildlife for the long term (Sawchuk 2004).

In the late 1990s, British Columbia citizen activists organized a campaign to protect the fjords, salmon streams, and unlogged watersheds of the mid-coast. Cleverly rebranding the area as the Great Bear Rainforest, they secured important philanthropic support from a variety of American philanthropic foundations and ran a very successful public engagement campaign in the Lower Mainland media. In tandem, some activist groups targeted the international markets of forest products companies to prevent further logging of the area. First Nations were also successfully engaged and a model was created that not only addressed their conservation interests but also their economic needs. A conservation area design based on conservation biology principles was developed to provide a rationale for the scale of conservation sought. Despite the British Columbia government's election platform of "no new parks," it became very interested in conservation of the area. About CDN\$60 million was raised from American and Canadian philanthropic supporters and finally in January 2008 the government of Canada made a financial contribution that sealed the deal.

The result was a conservation matrix that covered an area of 8.75 million hectares and created 110 "conservancies" over about one-third of the area. These conservancies are a new form of protected area that was established under a 2006 amendment to the Parks Act, the Park (Conservancy Enabling) Amendment Act. The conservancies are set aside to protect and maintain their biological diversity and natural environment; preserve and maintain social, ceremonial, and cultural uses of First Nations; protect and maintain their recreational values; and ensure that development or use of their natural resources occurs in a sustainable manner consistent with those purposes. A park use permit may be issued to authorize certain uses that, in the opinion of the provincial minister of the environment, will not restrict, prevent, or inhibit the development, improvement, or use of the conservancy in accordance with the purpose for which it was set aside. However, commercial logging, mining, and large-scale hydroelectric power generation are expressly prohibited. A complex,

multi-faceted Great Bear Rainforest Agreement was also signed. Steps remain to fulfill all aspects of the agreements, such as conservancy management planning, the enactment of biodiversity areas, and establishing a regional plan for conservation outside of protected areas (see www.savethegreatbear.org).

At the end the 1990s, Pew Charitable Trusts, a foundation based in Philadelphia, Pennsylvania, which had previously supported conservation work in British Columbia and elsewhere in the world, developed a strong interest in international boreal forest conservation and launched the International Boreal Conservation Campaign (www.interboreal.org). Working with Canadians, Pew also launched the Canadian Boreal Initiative (www.borealcanada.ca). Together, they developed a Boreal Forest Conservation Framework that has now been signed onto by many NGOs, First Nations, and businesses. Its goal is to protect at least 50% of the boreal forest and ensure that world-class standards are applied to extractive activities on the rest. This is based on the best scientific information available about what truly effective conservation would require (Schmiegelow 2006). It has been successful in enabling important conservation outcomes working with First Nations communities, NGOs, and government (see discussion below).

By 2008, most of Canada's national NGOs with an interest in conservation had embraced the goal of protecting at least 50% of Canada's remaining wild areas and begun advocating for it publicly (www.tomorrowtodaycanada.ca).

#### Ecological integrity and Canada's national parks

On the parks integrity front, the success of the Banff–Bow Valley study and its wide acceptance by the public gave rise to a Canada-wide study of our national parks. The Panel on the Ecological Integrity of the National Parks of Canada was composed of academics, public servants, First Nations, and civil society members who looked into the national park system as a whole and found it wanting. It recommended a greatly increased investment in science and amendments to the National Parks Act to ensure the unquestioned primacy of ecological integrity in all aspects of park decision-making. Inspired in part by the Yellowstone to Yukon idea, the panel also recommended that we move from considering parks as islands to managing parks in networks. This 1999 report was accepted and implemented to a significant degree (Parks Canada Agency 2000). A few years later, after going through a public consultation process, Ontario also upgraded its provincial parks legislation to make ecological integrity the priority for its first-class network of parks.

Thus the 21st century began with civil society playing a renewed and vigorous role in shaping both park management and new park creation.

#### Challenges and opportunities lie ahead

**Canada's international obligations have remained unfulfilled to date** Canada is a signatory to the Convention on Biological Diversity (CBD), which obliges all parties to develop national strategies for the conservation and sustainable use of biological diversity. Civil soci-

ety has been remarkably silent about our responsibilities under this convention, in contrast to the intense public discussion about the Framework Convention on Climate Change and the Kyoto Protocol.

The CBD's far-sighted Program of Work on Protected Areas sets out an effective blueprint for action on the world's protected areas (CBD 2005) with important reporting deadlines in 2010 and 2012. Even though Canada is doing one of the better jobs of interim reporting under the convention, we are far behind in achieving the goals of the program of work, particularly with marine protected areas. (Indeed, our record in marine conservation is appalling, with less than 1% of our waters protected despite the catastrophic decline in cod and salmon stocks we have witnessed in the last two decades.) Canada's performance under the Convention on Biological Diversity should be the focus of greater civil society interest and engagement. Given our wealth and protected areas experience, Canada should also take a lead in assisting developing nations with their protected areas.

The courts have been slow to recognize the obvious primacy of civil society Strangely, it took our courts a long time to overcome the inherent bias in our legal and economic system in favor of private ownership as opposed to recognizing the primary interest of civil society in protected areas. Thus in 1972, a citizen named Larry Green was refused standing (which means the right to bring a case to court) in his effort to stop a commercial gravel operation adjacent to Sandbanks Provincial Park, Ontario. But in the late 1980s the law of standing was loosened. The Sierra Club Legal Defense Fund (now called Ecojustice) was opened in the early 1990s as a public-interest law firm and its first big project was to work with CPAWS to sue the minister of the environment to stop logging in Wood Buffalo National Park. The suit was resolved by a consent judgment declaring logging illegal and invalid in national parks (Locke and Elgie 1995). Here, CPAWS's standing was not even challenged. But in 1993 when CPAWS sued Sunshine Village ski hill and the minister of environment, its standing was challenged. The federal court of appeal ultimately ruled that CPAWS did have standing to sue, noting that "CPAWS has demonstrated, early in the process, a genuine interest as a public interest group. The primary objective of CPAWS and its members is to preserve the integrity of the ecosystem in Canada's parks and wilderness areas." Finally at end of the 20th century, civil society was recognized as having a right to sue in Canadian courts to protect the public interest in parks and protected areas.

The principle of public ownership and civil society's legal standing to defend that right have become so quickly enshrined that in 2006, when the government of Quebec wanted to sell off parts of Mount Orford National Park (as noted above, Quebec calls its provincially established parks "national" parks) to promote condominium development, allegedly to stimulate economic activity, they either had to amend the Parks Act to remove the lands from the park or else face a lawsuit. The minister of the environment resigned in protest over the amendment legislation. The privatization of this civil society asset triggered a massive public reaction that included 10,000 people marching in protest through the streets of Montreal (Figure 4). A spontaneous grassroots group, SOS parc Orford, formed to lead the fight (www.sosparcorford.org). It became an election issue. The new minority government backed off substantially due to the public reaction but the issue remains in play. The strong public reaction to privatizing part of Mount Orford Park also killed a similar proposal for



**Figure 4** On April 22, 2006, ten thousand people marched in the streets of Montreal to protest removal of part of Quebec's Mont Orford provinical park for condominium development. Photo courtesy of La Société pour la nature et parcs du Canada.

housing on valuable lands at the edge of Montreal in Isle de Boucherville National Park. Similarly, strong public engagement has encouraged the Quebec government to make major advances, including establishing a Roster of Protected Areas that ensures proper standards for its protected areas. The percentage of Quebec's surface in protected area status has moved from 0.67% in 1999 to 8.12% in 2009, with promises of further action (Beauchamp 2008; Charest 2009).

**Aboriginal rights have created an important new interest in protected areas** In the last 30 years, first peoples' rights have been recognized through jurisprudence and the Constitution Act of 1982. These rights have important implications for protected areas, particularly in regions where new treaties are negotiated. In some protected areas, this gives the relevant aboriginal group standing of equivalence to civil society along with unique rights of harvest that are subject to the public interest in conservation. In others, such as the new conservancies established by the British Columbia government under the Great Bear Rainforest deal, aboriginal rights could be argued to be senior to civil society's interest. When these important aboriginal rights have been exercised in conjunction with civil society support, good things have resulted for protected areas.

The successful 1980s campaign to protect South Moresby Island in Gwaii Haanas National Park Reserve had significant leadership from the Haida and wide support from NGOs that elevated it to a national issue. It has had positive long-term consequences. The Haida now play a major role in park management. In the marine environment, the Haida and the federal government have recently negotiated a memorandum of understanding to create a marine protected area in the Bowie Seamount, which has been a focus of CPAWS campaign work in conjunction with the Haida (www.cpawsbc.org). Building on the national park reserve, the Haida have also recently achieved protection of nearly half their homeland through a combination of court challenges and negotiations with the province of British Columbia to create new conservancies (British Columbia and Council of the Haida Nation 2007).

In April 2008, the Sahtu people agreed with Canada to withdraw from mineral exploitation 7,600 square kilometers in the headwaters of the South Nahanni River for the proposed Nááts'ihch'oh National Park that would abut the newly expanded Nahanni National Park (about which more below; see also Parks Canada Agency 2008). If all goes well, the two new parks would protect 99% of the South Nahanni watershed and the adjacent karstlands in national parks, totaling about 39,000 square kilometers, which would be one of world's greatest parks.

The Dehcho First Nations have also advanced a land-use plan that calls for protection of about half their traditional area as part of their treaty negotiations with Canada. As of April 2008, the amount of protected areas they seek is 25% in federal protected areas (part of which is Nahanni) and 24% in other conservation areas (www.dehcholands.org).

Other recent events in the Mackenzie Valley in the Northwest Territories show the power of effective collaboration between aboriginal peoples and civil society groups. The federal government's 2007 announcement of interim protection for the East Arm of Great Slave Lake for a national park, other nearby lands called Akaitcho, and also the Ramparts wetlands for a national wildlife area, totaled over 100,000 square kilometers. Earlier in the year a new national historic site was created on two peninsulas (Sahoue and Edacho) of Great Bear Lake (Baird 2007). While government departments such as Parks Canada and the Canadian Wildlife Service did important work on the Northwest Territories Protected Areas Strategy, this protection was accomplished in significant measure because of collaborations between First Nations communities and Ducks Unlimited, World Wildlife Fund, and CPAWS, with national co-ordination through the Canadian Boreal Initiative. Together, these new sites amount to one of the largest conservation announcements in Canadian history (Parks Canada 2007), though some more "after-sales service" is needed before they can be considered permanently protected.

Two direct examples of an agenda set by civil society entering directly into public policy occurred in 2008. Premier Dalton McGuinty of Ontario announced in July that at least half of that province's vast Far North would be protected. A land use planning process is being developed with that policy at the center; the intended result is that about 225,000 sq km of boreal forest, wetlands and tundra will be protected. Then in November 2008, during the provincial election campaign which his party won, Quebec Premier Jean Charest promised to protect at least half of Quebec north of the 49th parallel. This amounts to 70% of the province; the area protected would cover approximately 500,000 square kilometers, an area about the size of France. The combined effect of conservation at this scale in Ontario and Quebec will be among the largest conservation actions in human history. Ontario initiated a bill in June , the Far North Act, that calls for "at least 225,000 square kilometers of the Far North in an interconnected network of protected areas" through a planning process that involves First Nations communities, but it has not yet passed. Quebec has yet to create its legal framework.

# Nahanni expansion confirms the primacy of civil society and the role of aboriginal people in Canada's new parks

The expansion of Nahanni National Park Reserve from 4,766 to over 30,000 square kilometers by special act of Parliament in June 2009 was not only a remarkable act of conservation that created one of the world's largest and most spectacular parks, but also confirmed the primacy of civil society and the role of aboriginal people in Canada's new national parks.

The park enlargement followed a seven-year campaign for the expansion of the existing Nahanni National Park Reserve in order to protect the entire South Nahanni watershed and adjoining karstlands. As noted above, the Dehcho had determined in 1999 that they wanted the entire watershed protected and there were adjacent globally significant karstlands of great conservation interest. The Dehcho invited CPAWS to work with them to achieve protection of all of it. The public campaign, led by CPAWS, included the Dehcho, scientists, a major outdoor gear retail cooperative, and river outfitters. The collective effort included a cross-country speaking tour that went to nineteen cities.

The first success was the 2002 announcement by Prime Minister Chrétien that the park expansion would form part of Parks Canada's action plan, but the size of the expansion was unspecified. The next major success came in August 2007, when Prime Minister Stephen Harper flew to spectacular Virginia Falls on the South Nahanni River (Figure 5) to announce a "massive" but still unspecified park expansion (Harper and Baird 2007). But that was not the end of it.

Despite a year of determined effort, Environment Minister John Baird could not get a boundary established before a federal election intervened. This is because in Canada there is often a lag between the public announcement of a plan and the enabling legislative outcome. This lag period is a critical time for civil society engagement, for it is often at this stage that special commercial interests such as the mining industry seek to restrict or avoid a final outcome through the political and bureaucratic process. The Nahanni was no exception. CPAWS in particular engaged in a great deal of "after-sales service" to see that the commitment was kept and that the public interest in the largest expansion possible was served. It was not until June 2009 that a bill specifying the size of the expansion was introduced in the Canadian Parliament (Locke 2009). But it moved quickly through the legislative process into law with unanimous agreement because strong public support had been demonstrated and the Dehcho First Nations were so clearly supportive.

Two passages from the parliamentary debates on the Nahanni expansion are illustrative of the primacy of civil society and the aboriginal interest in Canada's new national parks. The bill's sponsor in Parliament, Conservative Environment Minister Jim Prentice, said at Second Reading "the Nahanni is central to our identity as a people, is central to our identity as



Figure 5 Virginia Falls on the South Nahanni River, part of Nahanni National Park Preserve. It was here that the prime minister announced a major expansion of the park. Photo courtesy of Harvey Locke.

a country" and concluded that the park expansion "is in effect the Dehcho's and Canada's gift to humanity." At Second Reading of the Nahanni Bill in the Senate, Liberal Senator Grant Mitchell described the fundamental connection between the efforts of civil society and the national parks of Canada: the public campaign "reflects the deep relationship Canadians have with wildlife, with ecosystems, with the outdoors of our country. I think there are times when we all too easily take that for granted. We forget how important our wildlife and surroundings are to us—the magnitude of the beauty, the depth of the beauty, the remarkable and wonderful nature that Canadians enjoy. This park is a very important step in capturing that nature and in preserving one of the most important and significantly beautiful areas of this country for Canadians."

#### The future

The natural world is unraveling. While Canada has created some of the world's finest protected areas, they are not adequate to save our part of life on Earth. Twenty-first-century challenges such as climate change, habitat fragmentation, species extinction, and ocean fisheries depletion require an organized and forceful response from civil society centered on protecting at least half of Canada's wilderness lands and waters in effectively managed and interconnected protected areas.

One such effort is the newly launched Big Wild campaign, a shared effort of the Mountain Equipment Coop, which has retail stores across Canada and 2.7 million members, and CPAWS, which has volunteers and staff across the country. The campaign aims to build the public constituency for those goals through a variety of citizen engagement techniques, including an interactive website (www.thebigwild.org). It will take this kind of effort and much more from civil society if we are to do what needs to be done with protected areas.

Recent scientific research has shown that Canada's wilderness is a vast storehouse of carbon and that nature conservation is a first-order strategy in the effort to mitigate and adapt to climate change. Canada is a signatory to two global conventions, the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity but actions under the two are fragmented and far behind schedule despite the urgency of the warming climate and the extinction crisis. Canada should be part of a major initiative to ensure that the actions under the two conventions are linked and accelerated (Locke and Mackey 2009).

The words of Canada's first parks commissioner, J.B. Harkin, are still relevant: "What is needed in Canada today is an informed public opinion which will voice an indignant protest against any vulgarization of the beauty of our national parks or any invasion of their sanctity. Negative or passive good will that does nothing is of little use. We need fierce loyalties to back action." We need to take those words even further today. It is time for civil society to elevate protected areas to the center of Canada's public agenda.

[Ed. note: This paper was adapted from an earlier one commissioned for presentation at the "Canadian Parks for Tomorrow: 40th Anniversary Conference," University of Calgary, Alberta, Canada, 8–11 May 2008. The original paper, along with others from the conference, can be found at https://dspace.ucalgary.ca/handle/18801.)

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