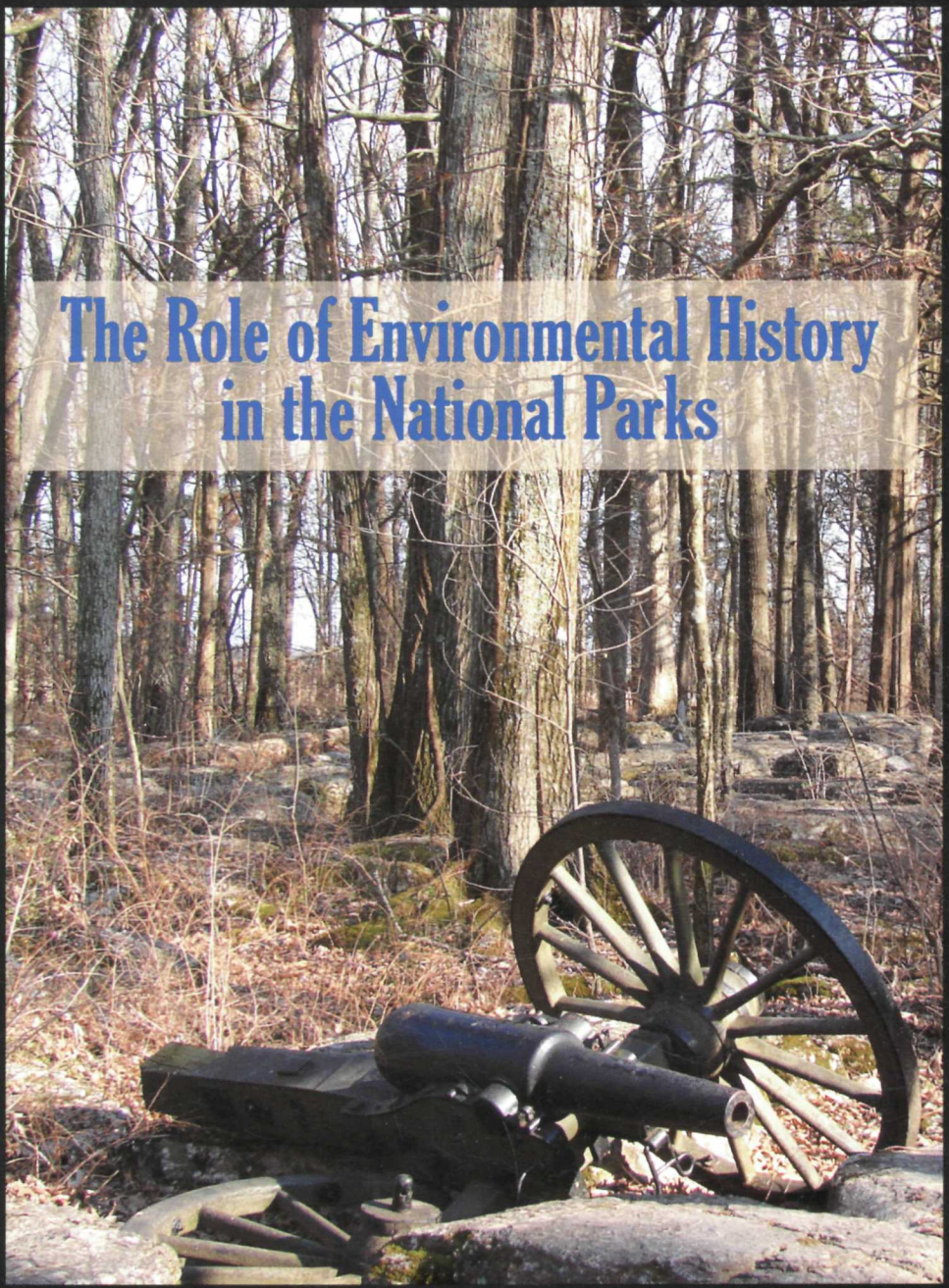


The Role of Environmental History in the National Parks

The George Wright Forum

The GWS Journal of Parks, Protected Areas & Cultural Sites

volume 28 number 2 • 2011

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.

Executive Office

DAVID HARMON, **Executive Director**
EMILY DEKKER-FIALA, **Conference Coordinator**
P. O. Box 65 • Hancock, Michigan 49930-0065 USA
1-906-487-9722 • info@georgewright.org • www.georgewright.org

Publications Committee

JAN W. VAN WAGTENDONK **(Chair),** DAVID GRABER, ROLF DIAMANT, LAVELL MERRITT, JR., ABIGAIL MILLER, JOHN WAITHAKA; REBECCA CONARD & DAVID HARMON **(Co-editors, *The George Wright Forum*)**

ISSN 0732-4715. Editorial and manuscript submission guidelines may be found at www.georgewright.org/forum. Text paper is made of 50% recycled fibers. Printed by Book Concern Printers, Hancock, Michigan.

The George Wright Society is a member of US/ICOMOS (International Council on Monuments and Sites—U.S. Committee) and IUCN, the International Union for the Conservation of Nature.

The George Wright Forum

The GWS Journal of Parks, Protected Areas & Cultural Sites

volume 28 number 2 • 2011

On the cover: The area known as the "Slaughter Pen" at Stones River National Battlefield, Tennessee, was the scene of some of the bloodiest fighting of this important Civil War clash. The Slaughter Pen is now a key interpretive site in the park. See article starting on p. 161. Photo courtesy of Rebecca Conard.

SOCIETY NEWS, NOTES & MAIL

New rule would clear path for federal employees to serve on nonprofit boards

In May, the Office of Government Ethics (OGE) proposed a rule that would clear away the confusion currently reigning over whether active-duty federal employees are allowed to serve on nonprofit boards. At present, each federal department has its own interpretation as to whether service on outside boards is prima facie a potential conflict of interest; within departments, individual agencies also interpret what is permissible differently.

Last year, the National Park Service, acting under the direction of the Department of the Interior, prohibited its employees from serving on the board of the George Wright Society, citing the potential for a conflict of interest because of the close working relationship between NPS and GWS and because of the number of NPS employees serving on the GWS Board. The new rule could potentially open the door to NPS employees serving again.

Public comment on the proposed rule concluded in early July, and we sent a letter strongly supporting it. "It is very important for current federal employees to have the opportunity to take part fully in the activities of professional societies, including serving in governance positions," our letter said. The federal government must recognize that "federal employees who are themselves professionals have a legitimate expanded role to play: both as representatives of their agency, and as members of a professional community committed to making intellectual advances in the discipline and upholding the integrity of professional conduct within the discipline. Membership in professional organizations, up to and including serving on their governing boards, is a vital part of professional growth and career development." A decision on the proposed rule is expected within a year.

Next Park Break scheduled for March 2012

The next installment of the Park Break alternative spring break program will be held at Delaware Water Gap National Recreation Area in Pennsylvania, March 19–23, 2012. Park Break is an all-expenses-paid, park-based field seminar for graduate students who are thinking about a career in park management or park-related research and education. Park Break puts grad students in a national park unit for up to a week's worth of field and classroom activities in close collaboration with park scientists and scholars, managers and administrators, and partner organizations.

The 2012 Park Break project topic will be the creation of a curriculum on sustainable living to be used at the Pocono Environmental Education Center. Park Break student participants will draw on the context of several energy projects that are affecting or could affect the park, such as natural gas drilling in the Marcellus Shale formation north of the park, to the proposal for a power line that would cross the park.

Park Break is a joint program of the GWS, National Park Service, and US Geological Survey. For more information, go to http://www.georgewright.org/parkbreak.

Copies of GWS2011 Program & Abstracts available to members for nominal fee

Did you miss the GWS2011 Conference, but would like to know what happened in New Orleans? We have a small number of copies of the GWS Program booklet (44 pp.) and the Abstracts book (232 pp.) available as a set, and would love to get them into your hands. For GWS members, we'll provide you copies for just a $4.00 shipping charge (to US addresses only; if you are a member outside the US, contact us for shipping costs). For non-members, the cost is $18.00. Contact us at info@georgewright.org for ordering instructions.

Annual GWS Board election to commence in September

As noted in the last issue, this year there are two seats on the Board of Directors up for election. One is held by Gary E. Davis, who will be running for re-election, and the other by Rebecca Conard, who is stepping down. A slate of candidates has stepped forward, and the election will begin in early to mid-September. Voting is entirely online, so it is important that we have your current email address so we can send you a link to the ballot (including candidates' statements); your email address is also used to gain access to the ballot. If you've recently switched emails, contact us at info@georgewright.org so we can update our database. Then, watch your in-box for the election notice.

A Legacy of Neglect: The Ozark National Scenic Riverways

Susan Flader

Missouri's Current River and its tributary, the Jacks Fork, were the nation's first federally protected rivers. Congressionally authorized in 1964 as the Ozark National Scenic Riverways (ONSR), they served as a prototype for the National Wild and Scenic Rivers Act of 1968. But in May 2011 ONSR was identified by American Rivers as one of America's ten most endangered rivers, owing to a history of inadequate management by the National Park Service (NPS).

The spring-fed, bluff-lined Current and Jacks Fork are the preeminent "float streams" in a state where floating, fishing, and camping by johnboat or canoe have long been favorite pastimes (Figure 1). The state's first Republican governor since Reconstruction, Herbert Hadley, led well-publicized float trips on Current River as early as 1909 in an effort to promote tourism and build support for a state park system. When Missouri acquired its first state parks in 1924, they included Round Spring and Big Spring on the Current River and Alley Spring on the Jacks Fork. The rivers early attracted admirers from afar; Aldo Leopold came from Wisconsin in 1926 to float the Current from Van Buren to Doniphan with his brothers (Leopold 1953; Figure 2), then in 1929 bought a shanty on its bank as a base for annual hunts, years before he acquired his celebrated shack in the sand country of Wisconsin.

Like many other rivers that eventually won designation as national wild and scenic rivers, the Current was threatened by proposed hydroelectric dams. While the notion of a riverine park had been advanced by a local hunting and fishing club as early as the 1920s, even before authorization of two dams on the Current in the 1930s, a recommendation that the river remain free-flowing and developed for recreation, as advocated by local groups and state officials, emerged from the Arkansas–White–Red River Basins Interagency Committee in 1954 and resulted in two NPS-led studies later that decade (DRD 1956; NPS 1960). The first study proposed designation of about two-thirds of the *watersheds* of the Current, Jacks Fork, and Eleven Point rivers as a national recreation area, with special emphasis on preservation of the streams and springs; the second, after the US Forest Service (USFS) objected to the incorporation of 350,000 acres of national forest in the NPS-led project, proposed

The George Wright Forum, vol. 28, no. 2, pp. 114–126 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

NPS acquisition of 113,000 acres of river corridor as a national monument, most of it preserved in wilderness-like settings with minimal development.

Two types of bills—one providing for administration of the rivers by USFS, the other by NPS—were introduced in Congress beginning in 1960. The USFS advocates, including

Figure 1. Fog lifts from Current River on an October morning. Photo courtesy of Wayne Goode.

Figure 2. Aldo Leopold and his brother Carl pole a johnboat on a 1926 float and hunt trip on Current River south of Doniphan. Photo courtesy of Aldo Leopold Foundation.

conservationist Leo Drey of St. Louis, who owned some 130,000 acres of forest with 35 miles of frontage on the Current and Jacks Fork, argued that the USFS was already known and relatively accepted by Ozarkers and had ample land on which small recreational impoundments could be developed, thus helping to disperse recreational pressure and better preserve the three rivers; they favored continued multiple use of the watersheds and the use of scenic easements to protect the rivers without unduly infringing on private property. Advocates for NPS management were led by newspaper columnist Leonard Hall, who had just published *Stars Upstream* (1958) arguing for protection of the Current as a national river, and George Hartzog, who as superintendent of the Jefferson National Expansion Memorial (the Arch) in St. Louis had been appointed NPS lead in promoting the new area (Stevens 1991; Flader 2008).

But when Interior Secretary Stewart Udall floated the Current in 1961 with Hartzog and Hall, and President Kennedy subsequently endorsed the plan for an Ozark National Monument, the die was cast in favor of the National Park Service. As another consequence, Hartzog would be appointed by Udall as NPS director in 1964 (Udall 1988), and ONSR would be his first new park. As part of the deal that led to congressional approval of Ozark National Scenic Riverways in 1964 (Public Law 88-492, enacted August 27), the lower Current, with better agricultural land along its banks, and the Eleven Point, which flowed largely through national forest, were dropped from the bill; the state agreed to transfer to NPS its three big-spring parks on the Current and Jacks Fork as focal points of the new ONSR; and NPS agreed to allow hunting in the park and the use of scenic easements as well as eminent domain to protect the river corridor. The Eleven Point, in turn, would become one of the initial rivers designated in the National Wild and Scenic Rivers Act of 1968, under USFS management.

ONSR included 134 river miles with two gaps at the towns of Van Buren on the Current and Eminence on the Jacks Fork. Its watershed boasted a world-class spring system unparalleled in North America, with 350 springs, many of them located near the rivers (including the largest spring to date in the national park system), and more than 330 caves. As scientists undertook more intensive ecological surveys, they would begin to appreciate that the Current River watershed is an international center for biodiversity, with more than 200 endemic species. As of 2010, the area included two federally listed endangered species (gray and Indiana bats), another proposed for listing (the iconic Ozark hellbender salamander), and 70 state-listed rare or endangered plant and animal species. The riverways also abounds with archaeological sites, historic structures, and landscapes reflecting 12,000 years of human habitation.

But except for the three state parks, which were transferred to NPS in 1970, most of the land within the authorized boundaries of the narrow riverine park was private, and would have to be acquired in fee simple or protected from development and timber-cutting by scenic easement. Because NPS insisted on the right of public access 300 feet back from the river on scenic easements, many fiercely independent Ozark farmers, who disliked any kind of government control, felt forced to sell. But Congress authorized only $7 million in the 1964 act to acquire up to 65,000 acres of private land, leading NPS officials to set upper limits on appraisals, which meant that more than 200 cases ended up in court. Although the courts

tended to set considerably higher values than initially offered by NPS, the forced sales and contentious proceedings led to a heritage of ill will toward NPS by many in the region (Sarvis 2000). Meanwhile, the more urban owners of riverside cabins, who had been expected to sell with life tenancy, instead were offered and opted for easements with essentially perpetual tenancy.

Because ONSR was the first such park, NPS officials were necessarily learning on the job; until Cape Cod National Seashore (1961), most previous national parks had been acquired by transfer of other public lands or donated private land. Moreover, Hartzog's dynamic tenure as director, coinciding with the new Land and Water Conservation Fund (1964), led to the rapid acquisition of 70 new national parks, so there was a shortage of experienced administrators. Meanwhile, the public flocked to the newly designated riverways before NPS was ready. Local outfitters and others who had operated small businesses along the rivers for decades bought more canoes to satisfy the demand and exercised disproportionate influence on local NPS officials.

Canoeists, who reached an estimated 40,000 in 1968, climbed to 145,000 in 1973 and nearly 300,000 by 1979, out of total visitation of nearly 2 million. Moreover, canoeists and other visitors were concentrated in certain stretches and on summer weekends. Though NPS sought some control in 1970 by licensing 16 canoe outfitters, dozens of others operated without permits, launching canoes just upstream of the park boundary. An unfavorable court decision in 1976 stifled NPS efforts at control, though subsequent decisions in the early 1980s were more favorable.

Controversies over efforts at control, coupled with a rapid turnover of superintendents in the early years, stymied the development of a general management plan (GMP) for the park. While USFS completed a plan for the Eleven Point by 1973 and the Buffalo National River in Arkansas, designated in 1972, had a plan by 1977, an initial draft prepared for ONSR was rejected by Washington NPS officials in 1976 and a new draft was not prepared until 1981, finally winning approval in 1984 (NPS 1984). Two decades after Congressional designation, ONSR officials finally had a general outline for management, but it was a plan that called for more studies to support more specific plans on a host of issues that had already been festering for decades.

The 1984 GMP, which is still in effect today, reaffirmed NPS commitment to preservation of natural and cultural resources and the scenic and ecosystem integrity of the riparian corridor, and called for studies to determine levels of use that certain areas could experience without resource degradation. It affirmed the early policy of developing visitor service areas with river access, campgrounds, and other facilities at sites within a day's float from each other—initially 13 such sites, now 19. The plan also acknowledged the existence of some 40 *de facto* camping and river access sites generally accessible by unimproved county roads and provided for a more detailed study of them and of other roads, traces, and horse trails in the riparian corridor.

Deleted from the final plan owing to ongoing litigation were any proposals regarding management of river uses, but after NPS authority to regulate canoes was affirmed the park issued a draft river management plan (NPS 1989). Canoe rental had greatly outpaced the increase in other river uses until 1979, when it leveled off at about 300,000 visitor-days per

year, suggesting that it had reached carrying capacity (with 61% of respondents perceiving crowding). But after a court decision allowed park officials to begin controlling rental numbers and put-in locations in 1984, perceptions of overcrowding declined to 38%. Meanwhile, motorboating increased from 3,600 boat-days in 1974 to 12,000 in 1980 with the introduction of jetboats, which could be operated with less knowledge of specific river conditions. While most canoeists were non-local, motorboaters were mostly local and concentrated in the lower river around Van Buren, the park headquarters, where they could more easily influence park officials. Motorboating was the most controversial issue in the plan, with many jetboaters not wanting any regulation and many canoeists (and, presumably, tubers) asking for complete elimination. The plan proposed zones with motors of no greater than 25 horsepower (hp) in the upper reaches (10 hp at peak times), 40 hp in the middle, and no limits below Big Spring (or in the gaps), to take effect in 1993 (on the Buffalo River the limit is 10 hp, on the Eleven Point 25 hp).

River access and camping issues were deferred to the roads and trails study, for which NPS commissioned two field studies in 1986. One compiled an inventory of 352 roads and traces with a total distance of 318 miles within ONSR boundaries, of which 93 (including the official developed areas) provided river access. The other study identified a total of 62 riverbank "primitive areas" (up from 40 estimated in the GMP), most of them accessible by land vehicle, and reported that these sites, on average, had lost 58% of their ground cover and had four trees damaged (Mendiola 1986). How many of these roads and campsites already existed in 1964 has not been determined.

The field inventories provided data for a roads and trails study, issued in 1991, in which park officials sought to develop a protocol for closing problematic roads and vehicular access to primitive camps (NPS 1991). They excluded from consideration any county roads, undoubtedly to avoid confrontation with county officials. More inexplicably, they elected not to close other roads that led to primitive sites, despite numerous visitor comments and letters decrying the "visual intrusions of large numbers of vehicles along the riverways." In the end NPS proposed closing only 54 non-county road segments that jeopardized threatened or endangered species, showed resource damage or safety hazards, or provided redundant access.

The road closure alternatives included a short (less than 4-page!) environmental assessment, in which the socioenvironmental impacts considered solely the adverse impacts of closures on those who used the roads to access primitive areas, not the impacts on the far larger numbers of visitors who floated the rivers and objected to the intrusion of motor vehicles on riverbanks and gravel bars. It should be noted that the camping areas developed by NPS are all set back and screened from view from the river, while in the unofficial primitive sites anything goes, including slashing and mowing vegetation and reshaping banks to open the view and improve access to the river. Moreover, the roads to them are not shown on any ONSR maps for general visitor use, meaning they are available only to those—mostly local residents—who have heavy duty vehicles or all-terrain vehicles (ATVs) and can find their own way there on a maze of unmarked, often deeply rutted roads (Figure 3). Local Ozark families have been visiting the river for generations, and they want to be in their own spot, right on the river, not in a developed campground with others (Figure 4).

Figure 3. Welch Primitive Area directly across from scenic Welch Spring on the upper Current River is a maze of rutted, eroded traces, its vegetation degraded or stripped bare to the riverbank. Photos courtesy of Greg Iffrig and Jerry Sugerman.

Figure 4. Sinking City: A "primitive" gravel bar campsite on Current River. Photo courtesy of the author.

The 1991 study also reviewed horse trails. Though it briefly mentioned the need for an inventory of trails throughout the park and for measures to relocate trails out of floodplains, reduce river crossings, provide switchbacks on steep slopes, and prevent trampling and tree damage by horses, its discussion of management alternatives considered only officially designated trails. There were 14 miles of such trails at the time, all near the junction of the Jacks Fork and Current, where a commercial firm, located along the Jacks Fork on private land in the Eminence gap, offered stalls, camping and entertainment that attracted up to 2,500 riders and horses at a time. The study also noted that "horse use is permitted on all unpaved roads and traces within the park except where posted."

During the years following the 1991 roads and trails study, there was little information presented to the public about further NPS actions, monitoring or plans, only occasional anecdotal evidence or remarks of former or retired ONSR staff that fed a growing sense that all was not well. Visitation dropped from a high of nearly 2 million a year to only about 1.3 million. Many canoeists simply stopped going to ONSR, and others brought back reports of boorish, drunken behavior along the riverways, horses and ATVs in the river, inappropriate development, or obvious violations of scenic easements. There was a series of reports of high fecal coliform pollution from horses on the lower Jacks Fork (Davis et al. 2001–2006) and an eight-mile stretch of the river was added to the state's list of impaired waters. Ecologists grew concerned about the precipitous decline of the Ozark hellbender, found only in these rivers, and asked the US Fish and Wildlife Service to list it as an endangered species. County road crews brazenly bulldozed new roads to the river, knowing they would not be challenged. And ATV use proliferated, with one local dealer stocking so many that he had to store them, still crated, in stacks five or six high. New superintendents, soon after they arrived, would talk bravely about getting control of the problems, but later, when conservationists would ask them about specific issues, they would hear excuses or be told to wait for the new general management planning process. The GMP process, however, kept getting delayed, finally held scoping meetings in 2006, then went quiet again.

Meanwhile, leaders of a number of concerned conservation organizations started an informal Friends of Ozark Riverways (FOR) to discuss issues, seek reports and data through Freedom of Information Act (FOIA) requests, and begin to document problems in preparation for the upcoming planning process. One of the organizations, the Missouri Coalition for the Environment, filed suit against NPS regarding easement violations (especially unwarranted land exchanges and blatant new home construction; Figure 5) and repeated failure to follow the National Environmental Policy Act, resulting in serious degradation; they reached a settlement in 2006 in which NPS agreed to evaluate impacts on several already completed projects and commit to following the environmental review and public participation requirements of NEPA in the future. Another group prepared a slide program and then a video on "Why We Must Save the Current River, Again." When the time finally came, in the late summer of 2009, for public comment on preliminary management alternatives for ONSR, NPS was deluged with thousands of responses, reportedly more than on any recent issue except the Yellowstone winter use controversy—about half (largely from the immediate vicinity of the riverways, where ONSR held numerous meetings and media outreach) asking for "no action," meaning no further regulation, and the other half advocating much stronger management, resource protection, and restoration.

Even as NPS began digesting the dichotomous comments and preparing for the draft GMP, a FOR researcher, Jerry Sugerman, began plumbing NPS reports and aerial photographs in an effort to further document the proliferation of river access roads and horse use since the 1991 study. Some 30 of the 54 road segments designated for closure seemed to have been closed, many of them duplicate roads. It turned out that ONSR had done another park-wide field inventory of drivable roads within park boundaries during 2004–2005 with GPS technology and found a total of 346 miles, compared with 318 miles in the 1991 study, but never released the results (NPS 2005). Only 288 miles of the earlier roads were

Figure 5. A scenic easement where a new owner leveled the former site of a rustic cabin with dynamite and a backhoe to build a modern three-story house at the river's edge. Photos courtesy of Kally Higgins.

recorded as drivable in 2005, meaning there had been a gain of 58 miles of unauthorized new roads. Add to that the 17 miles of roads slated for closure in 1991 that still remained open and there were 75 more miles of roads than had been anticipated even in the weak rivers and trails study of 1991. Furthermore, instead of the 91 river access points accessible by motor vehicle that had been mapped in the 1991 study, there were now at least 136 (Figure 6). As FOR wrote in its illustrated report:

> The impact of all this vehicular activity along the riverbanks on soil stability and native riparian and aquatic habitats is severe. And the impact on the experience of many of the far greater numbers of people who annually float the rivers is gut-wrenching. There is almost nowhere that a floater can land on a gravel bar and walk into the woods without being assaulted by a maze of rutted, heavily eroded roads, scarred or dead trees, and degraded habitat, not to mention the frequent sights from the river of vehicles and their tire tracks on gravel bars and river banks. Moreover, many of the gravel bars originally intended by Congress and early park plan-

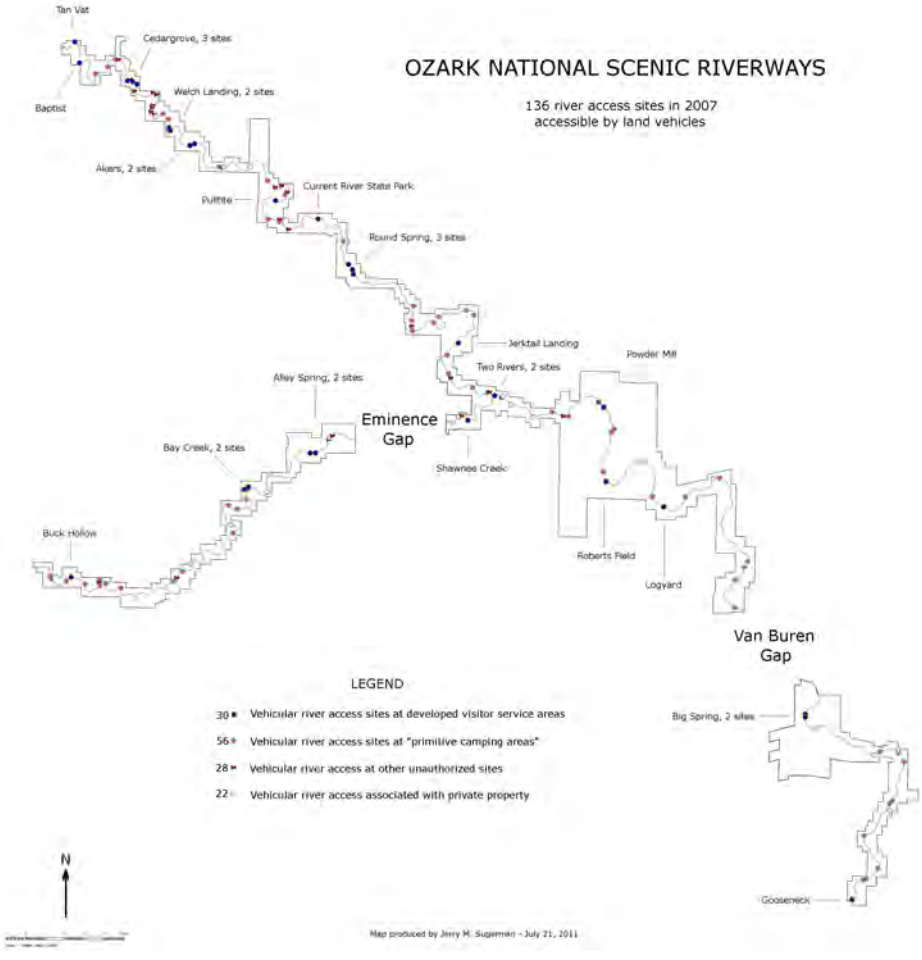


Figure 6. One hundred thirty-six river access sites accessible by land vehicles as of 2007. Map prepared by Jerry Sugerman for Friends of Ozark Riverways from ONSR reports and aerial photographs.

> ners for swimming, fishing, picnics, or overnight camping by floaters are appropriated by motor vehicles for weeks on end and virtually all are subject to invasion from the rear by horse riders by day and ATV and truck drivers by day and night. No wonder many people who formerly enjoyed floating the Ozark National Scenic Riverways no longer think of going there (FOR 2011).

Horse use and new *de facto* horse trails had also greatly proliferated. By 2010, Cross Country Trail Ride along the Jacks Fork boasted 3,003 stalls for horses, and there were numerous new horse facilities outside park boundaries whose riders used park roads and horse-made trails, especially along the upper Current River. From a FOIA request, FOR's Sugerman found that there had in fact been an abortive effort at dealing with the problem during the late 1990s under new ONSR Superintendent Ben Clary. At the initial staff meet-

ing in 1996, according to the minutes, "the biggest issue discussed" was the policy on use of non-designated horse trails in the 1991 roads and trails study: "Wording in the R&TP was not widely discussed prior to being inserted in the plan. 36CFR specifically states that horse use is prohibited outside designated trails" (NPS 1996).

At a meeting with equestrian stakeholders in 1999, Superintendent Clary said ONSR monitoring showed that horse use had doubled between 1985 and 1995 and it had clearly continued to expand since then, and he asked equestrians to help map all the trails within the park (NPS 1999). By April 2000 a core team had produced four large maps detailing the route of every segment of *de facto* horse trail, including river crossings. Within the 56-mile stretch of the Current from the upstream boundary to Goose Bay there were 51 miles of horse trail running parallel to the river *on the flood plain*, 83% of which were used exclusively for horse riding. There were nearly 30 miles of additional flood plain trail in other sections, in addition to numerous trails on higher ground. Using the four NPS maps, Sugerman digitized all the points where the *de facto* horse trails crossed a river or the park boundary, finding 83 river crossings and 164 boundary crossings (Figure 7).

Subsequently a team consisting of only one ONSR staffer and 19 equestrians proposed two different types of horse trail plans. One would have established 24 officially designated loop trails plus connector trails for a total of 259 miles, plus 25 staging areas, plus parking areas, comfort stations, signs, and hitching rails, all on park property. The other would have allowed for what might be described as non-designated trails of essentially the same configuration but without any signage; horse use and pack-in camping would be allowed on all trails, traces and roads in the park, with parking and horse camping allowed in all primitive areas. Whether because Clary retired and was replaced by a new superintendent who died within a year, or because the stakeholder-developed alternatives were deemed infeasible, or because park officials simply lost interest, the planning effort was apparently dropped. And there has apparently been no further effort to regulate horse use beyond some limits on group size in the permitting of four massive trail rides a year sponsored by Cross Country Trail Ride.

When a "listening session" for President Obama's initiative, America's Great Outdoors, was belatedly scheduled for East Alton, Illinois, in August 2010, at which Secretary of Interior Ken Salazar and NPS Director Jon Jarvis were present, several FOR members spoke passionately about the problems at ONSR, gave them written material and a blown-up version of Sugerman's map of river access points, and asked for their help. Salazar and Jarvis listened intently and promised to look into the problems. Subsequently, Jarvis and other NPS officials held a conference call with FOR to further discuss the problems. Because it became clear during that call that ONSR intended to proceed with its general management plan on the basis of its 1991 Roads and Trails Study, FOR prepared and submitted to Jarvis a report showing that the 1991 study was flawed and obsolete, asking for management of ONSR according to NPS standards and policies, and asking that NPS prepare a full environmental impact statement to address the cumulative environmental impacts of the proliferation of vehicular river access and uncontrolled horse use (FOR 2011). As of this writing, NPS has not yet responded to this request.

When American Rivers announced on May 17, 2011, that Ozark National Scenic Riverways was included on its 2011 list of America's most endangered rivers, citing overuse,

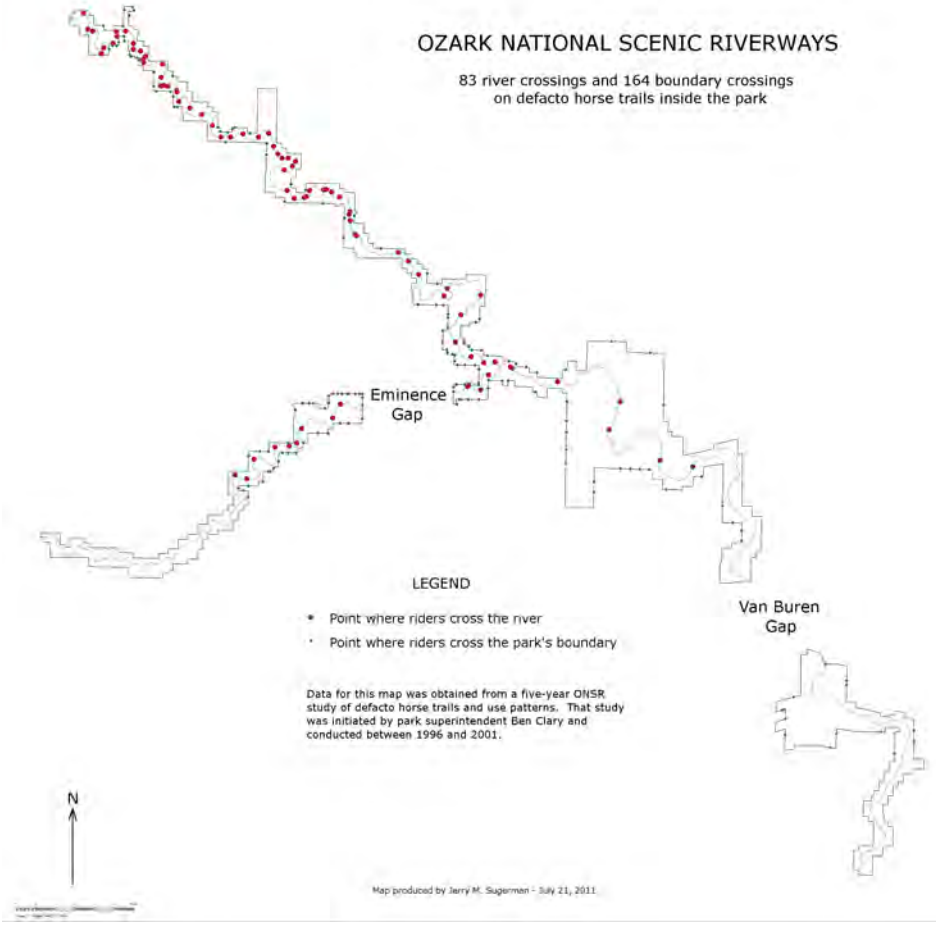


Figure 7. Eighty-three river crossings and 164 boundary crossings on de facto horse trails inside the park as of 2000. Map prepared by Jerry Sugerman for Friends of Ozark Riverways from ONSR maps.

poor planning, and inadequate management, the only known response from NPS came in comments on an article in the website "National Parks Traveler" (Repanshek 2011) from Faye Walmsley, information officer for ONSR, who questioned some of the statistics, pointing out that off-road use of ATVs in the park is illegal, as is horse use beyond the now-23 miles of designated trails. While national media coverage of the announcement tended to be matter-of-fact and urban media in Missouri supportive of increased attention to problems at ONSR, some local media along the riverways, as might be expected, were resentful of an outside organization meddling in local affairs. But even *they* acknowledged problems along the riverways.

The situation at Ozark National Scenic Riverways seems to be a classic case of park management "going local." New NPS officials assigned to the park recognize the problems when they first arrive, but soon realize that it is easier—perhaps even safer—to give in to vocal

local demands. There are some in the area who think that ONSR is not really a national park, that it is just a recreation area, but it is unclear from examination of the sources going back to the earliest involvement of NPS where that idea found support. There are legions of people in the region who love the rivers, are upset at what is happening to them, and want to see better management by NPS, though many have been reluctant to speak out. Midwest regional officials clearly recognized that ONSR is not being managed according to national park standards and policies, but they were willing to look the other way, perhaps out of wariness of a difficult political situation, or because they think the park is safely buried deep in the Ozarks and nobody much cares.

But the Current and Jacks Fork rivers, despite decades of abuse and neglect, are still by far the best—the most stunningly beautiful and most biologically, geologically, and culturally diverse—float streams in Missouri. These rivers were the first in the nation to be federally protected, and their watershed is an area of global biological significance. People travel hundreds or thousands of miles to float these streams, some of them annually. Ozark National Scenic Riverways, a prototype for our national system of wild and scenic rivers, is about to celebrate its fiftieth anniversary in 2014. Surely these rivers are worth the best management the National Park Service can provide.

> We have withdrawn from the rivers, our primary resource and purpose for the park. We have withdrawn from preserving and interpreting the Ozarks cultural heritage which is so important to the area.... Perhaps we need to re-evaluate where we are headed. Are we in fact Ozark National Scenic Riverways or Ozark National Scenic Campgrounds? While all of our activities and visitors are important to us, I think that it is time to start looking at quality and purpose as opposed to quantity.
>
> — *ONSR Superintendent Ben Clary to Congressman Bill Emerson, March 14, 1996*

References

Davis, J.V., et al. 2001–2006. *Assessment of Micro-biological Contamination of the Jacks Fork within the Ozark National Scenic Riverways, Missouri—Phase I (2001), Phase II (2002), Phase III (2006).* Water Resources Investigations Reports nos. 026-01, 02-4209, 2006-5161. Reston, VA: US Geological Survey.

Flader, Susan. 2008. Missouri's pioneer: A half-century of sustainable forestry. In *Pioneer Forest: A Half-Century of Sustainable Uneven-aged Forest Management in the Missouri Ozarks*. James M. Guldin et al., eds. General Technical Report no. SRS-108. Asheville, NC: USFS Southern Research Station.

FOR [Friends of Ozark Riverways]. 2011. Vehicles and horses in the riparian corridor: A call for management to NPS standards. January 28.

Hall, Leonard. 1958. *Stars Upstream: Life Along an Ozark River*. Chicago: University of Chicago Press.

Leopold, Aldo. 1953. Current River, 1926. In *Round River: From the Journals of Aldo Leopold*. Luna B. Leopold, ed. New York: Oxford University Press.

MDRD [Missouri Division of Resources and Development] et al. 1956. *Plan for Preservation and Development of Recreation Resources, Current and Eleven Point River*

Country, Missouri. Report prepared by MDRD, Missouri Conservation Commission, Missouri Park Board, and the National Park Service, U.S. Department of the Interior. Jefferson City: MDRD.

Mendiola, Victoria M. 1986. *Visitor Impacts and Use Patterns at Primitive River Campsites: An Evaluation of the Parkwide System, Ozark National Scenic Riverways. National Park Service.* TIC file address: Inventory and Use of Primitive River Campsites.pdf.

NPS [National Park Service]. 1960. *A Proposal: Ozark Rivers National Monument*. Washington, DC: NPS.

———. 1984. *General Management Plan and Development Concept Plan, Ozark National Scenic Riverways.* TIC file address: GMP DEC 1984 – OZAR_614_D1838A[48448].pdf.

———. 1989. River use management plan, Ozark National Scenic Riverways. TIC file address: OZAR_614_D117[48430].pdf.

———. 1991. Roads and trails study and environmental assessment, Ozark National Scenic Riverways. Copy of bound report obtained from OZAR Headquarters.

———. 1996. OZAR horse use meeting, August 25 (draft notes with exhibits), 35 pp., typescript.

———. 1999. OZAR horse use management plan work session minutes, October 21.

———. 2005. GPS roads project summary 2005 (Draft). Van Buren, MO: Ozark National Scenic Riverways.

Palmer, Tim. 1986. *Endangered Rivers and the Conservation Movement*. Berkeley: University of California Press.

Repanshek, Kurt. 2011. Unenviable list: Ozark National Scenic Riverways ranked among 10 most endangered rivers. *National Park Traveler* (online). May 17.

Sarvis, Will. 2000. Old eminent domain and new scenic easements: Land acquisition for the Ozark National Scenic Riverways. *Western Legal History* 13 (1): 1–37.

———. 2002. A difficult legacy: Creation of the Ozark National Scenic Riverways. *The Public Historian* 24 (1): 31–52.

Stevens, Donald L., Jr. 1991. *A Homeland and a Hinterland: The Current and Jacks Fork Riverways*. Historic Resource Study, Ozark National Scenic Riverways. Van Buren, MO: National Park Service.

Udall, Stewart. 1988. Introduction to *Battling for the National Parks*, by George B. Hartzog, Jr. Mt. Kisco, NY: Moyer Bell.

USFWS [US Fish and Wildlife Service]. 2010. Endangered and threatened wildlife and plants; Proposed rule to list the Ozark Hellbender salamander as endangered. 75 *Federal Register* 54561 (September 8).

Susan Flader, Department of History, University of Missouri, 101 Read Hall, Columbia, Missouri 65211-7500; fladers@missouri.edu

THE ROLE OF ENVIRONMENTAL HISTORY IN THE NATIONAL PARKS

David Louter and Lisa Mighetto, guest editors

Introduction

David Louter and Lisa Mighetto

In his recent documentary "The National Parks: America's Best Idea," Ken Burns explored the unique role of the National Park Service (NPS) in preserving the nation's past. The National Parks Second Century Commission Report, released in 2009, also highlighted the important connections between the places managed by the Park Service and key stories of US history. Yet one important question remains: what role do environmental historians play in the interpretation and management of these sites? In March 2010, the American Society for Environmental History (ASEH) and NPS examined this question during a full-day workshop on the relationship between environmental history and the agency. More than 80 people, including academics and Park Service employees, participated in the discussion and activities.

The following essays resulted from the presentations and conversations at this workshop. Generally, the authors examine ways in which environmental history can inform and influence management decisions and, specifically, how environmental historians can participate in decision-making processes. They ask how environmental history can advance the NPS role, as the nation's lead preservation agency, in interpreting environmental history for the American public.

We wish to thank the NPS for funding this project, and we are especially grateful to student assistants Alison Steiner and Neel Baumgardner.

David Louter, Pacific West Region, National Park Service , 909 First Avenue, Fifth Floor, Seattle, Washington 98104; david_louter@nps.gov

Lisa Mighetto, American Society for Environmental History, University of Washington Interdisciplinary Arts and Sciences Program, 1900 Commerce Street, Tacoma, Washington 98402; director@aseh.net

The George Wright Forum, vol. 28, no. 2, p. 127 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

Toward a History of Environmental History in the National Parks

Mark Fiege

Environmental history appears to be on the ascendance in the national parks. Increasing numbers of scientists and resource managers at all levels of the National Park Service (NPS) are using it to help them understand the interrelated human and non-human processes that have shaped the landscapes and resources in their care. Perhaps my own experience exemplifies the trend. Since 1995, I have participated in environmental history projects at Great Sand Dunes National Park and Preserve, Cache la Poudre River National Heritage Corridor, Sand Creek Massacre National Historic Site, Pecos National Historical Park, and Rocky Mountain National Park.[1] In addition, I have been working on a history of livestock grazing in the national parks, and although this is an administrative history that emphasizes management policies and decisions, it is informed by my understanding of environmental history.

All of these projects initially reinforced my sense that environmental history is a new methodology in the parks. Many of my NPS sponsors and research partners have told me that they think it is new, and the history of the field seems to support their claim. The American Society for Environmental History was founded in 1977, a relatively recent date in the history profession's evolution. Richard White titled his landmark 1985 essay "American Environmental History: The Development of a New Historical Field."[2] Not until the 1990s did academic history departments begin to train and hire substantial numbers of PhDs with environmental history expertise. The application of environmental history to resource management in the parks seems to be yet another sign of its increasing popularity. Thus my response to each park project on which I have worked has been the same: Isn't it remarkable that scientists and resource managers are recognizing the importance of this up-and-coming field?

Lately, however, I have begun to wonder if environmental history really is new to the parks, and indeed, even if it is a new field. My reading of national park documents has given me doubts. *Fauna of the National Parks of the United States*, for example, by George Wright, Joseph Dixon, and Ben Thompson, published in 1933 and generally known as *Fauna no. 1,* laid out a detailed outline of historical methodology for studying national park wildlife populations. "Determine original status of fauna in the park region," the three scientists direct-

The George Wright Forum, vol. 28, no. 2, pp. 128–147 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

ed. "Study the evidence on the ground.... Interview pioneers, early residents, etc.... Search written records.... Determine the history of the fauna in the region under white man's influence...."[3] Wright and his colleagues were not historians in the conventional sense, but their approach to the past calls into question easy assumptions about the newness of environmental history in the parks and its newness in general.

Some of the scientists and resource managers with whom I have worked have eroded my certainty even more. David Cooper, botanist, ecologist, and my colleague at Colorado State University, welcomed me as a national park research partner. Cooper learned from his doctoral adviser to ask historical questions of the landscapes that he studied, and he told me that our respective approaches to environmental history overlap by perhaps "75 percent."[4] Cooper and I are among several scientists, historians, and agency personnel who have begun to work on the environmental history of Rocky Mountain National Park and other sites, including on projects originated and headed by Ben Bobowski, a rangeland ecologist and the park's chief of resources. NPS once assigned Bobowski the difficult task of reducing the number of livestock in Glen Canyon National Recreation Area. He found that he was most effective if he knew the history of the landscape and the environmental biographies of the graziers who ran the cattle and the Bureau of Land Management range conservationists who kept the permits.[5]

So is environmental history in the national parks new or not? That question provides an opportunity to survey the history of environmental history and its place in the study and management of the parks. Such a survey might help scientists, historians, and NPS managers to understand better what environmental history is, what it might do for them, what its problems might be, and how it might serve them as an interdisciplinary methodology. That environmental history is not entirely new to the parks does not mean that scholars and professionals involved in its study completely agree on what it is or what it is for. The 75% overlap that Cooper identified in his work and mine is important, because it demarcates the intellectual ground on which scientists and historians can work together in pursuit of shared research objectives. But the 25% difference is important, too, because it delineates the disciplinary distinctiveness in how science and the humanities approach the past, and how each might have to flex in order more fully to cooperate with the other.

Here is a summary of my answer to the question of whether or not environmental history is new to the parks. Although this explanation reflects my scholarly assessment of written evidence, it also draws heavily on my personal experience, so readers should keep in mind my subjectivity and the limitations of my view. National park environmental history, it seems to me, is the outgrowth of a much older effort to identify and understand nature and the causes of environmental change. Going back at least as far as the early 19th century, scholars tried to describe the contingent, interrelated historical events, human and non-human, that shaped organisms, landscapes, and societies. No ideal label exists under which to categorize this work, but natural history might serve the purpose.[6] Rooted in Enlightenment empiricism, natural history gave rise to field biology, anthropology, geography, environmental history, and other disciplines, and it influenced early research in the parks. During the 20th century, academic specialization, reductive methodologies, bureaucratic compartmentalization, and other factors weakened it in academia and NPS. Nonetheless, the multidisciplinary cul-

ture of NPS—and, perhaps most important, the agency's need to understand and explain the histories of the resources in its care—sustained a persistent emphasis on natural history. History, meanwhile, remained a broad, synthetic academic discipline, and under the influence of 1970s environmentalism, historians wedded natural history and its descendents—primarily geography and ecology—to agricultural, economic, intellectual, political, and social history to create environmental history. The conjunction of environmental history with a vestigial NPS natural history gradually created the conditions for today's interdisciplinary national park environmental history.[7]

A brief survey cannot do justice to the origins and development of natural history, but perhaps I can begin by tracing the story from the late 18th and early 19th centuries, when academic and disciplinary boundaries did not constrain scholars and writers from studying nature in terms of historical processes that included humans. An argument can be made that the founder of modern natural history—and thus environmental history—was the Prussian scientist, explorer, and humanist Alexander von Humboldt. A holistic polymath who recognized the interconnection and unity of all things in the flow of time, "his foundational assumption," according to the intellectual historian Laura Dassow Walls, "was that neither humans nor nature can be understood in isolation."[8] Humboldt's interests carried him into geology, botany, climatology, ethnography, history, and much more, and he synthesized his findings in massive works of astonishing ambition, most notably his multivolume *Cosmos: A Sketch of the Physical Description of the Universe* (1845–1862). "The principal impulse by which I was directed," he wrote of its composition, "was the earnest endeavor to comprehend the phenomena of physical objects in their general connection, and to represent nature as one great whole, moved and animated by internal forces."[9]

Although Humboldt's influence on natural history was considerable, 20th-century scholars lost sight of it. Wars, revolutions, and political reactions, such as the suppression of German culture that accompanied the entry of the United States into World War I, eventually weakened Americans' memory of him. Equally important, modern scholarly specialization, in part the logical consequence of problems that Humboldt himself encountered in his struggle to master numerous scientific methodologies, gradually fragmented the intellectual unity to which he aspired and severed the study of humankind from the study of non-human nature. Only recently have scholars begun to rediscover how profoundly he shaped the interdisciplinary approach that defined natural history and that eventually yielded environmental history, among other disciplines.[10]

Following Humboldt, perhaps the greatest natural historian was Charles Darwin. *On the Origin of Species by Means of Natural Selection* (1859) laid out the evidence for a process—"descent with modification through natural selection"—according to which organisms changed over time. This "plan of creation," he wrote, called on humanity to "regard every production of nature as one which has had a history." Human beings themselves were part of the historical process. In their domestication of animal breeds, they were agents of change who provided striking examples of the effect of selection—intentional and unconscious—on species. And humans, too, were the objects of natural selection, the products of their own long, complex natural history.[11]

Whereas Darwin focused on species, other 19th-century scholars focused on geogra-

phy. And whereas Darwin, in contrast to Humboldt, recognized a ruthless "struggle for existence," a "war of nature, from famine and death" within the harmony and unity of natural selection, other scholars differentiated humanity from the rest of nature because of its self-destructive tendency to wreck nature's order. Of signal importance in this geographical and declensionist approach was George Perkins Marsh, whose *Man and Nature; Or, Physical Geography as Modified by Human Action* (1864) argued that "man is everywhere a disturbing agent" who upset nature's balance and literally eroded the capacity of civilizations to sustain themselves. Marsh surveyed the histories of Mediterranean societies and linked their demise to environmental processes such as overgrazing and deforestation and the silting up of harbors. Marsh was one of the first scholars, if not the first, to link human history and environmental change in such a dramatic fashion.[12]

The kinds of natural history that took shape in the 19th century flourished in the twentieth. The literature is vast and beyond the scope of this essay, but several examples stand out. John Muir, one of founders of the Sierra Club and a champion of Yosemite National Park and the Sierra Nevada, pieced together the geological history of the mountains and argued that the slow grinding work of glaciers, less sudden catastrophic disturbances, gave the peaks, canyons, and valleys their distinctive form. Detailed in various essays, Muir's findings took popular form in *The Mountains of California* (1894), one of his most famous works.[13] Close observation of natural history centered not just on geology, but also on changes in flora and fauna as observed and experienced across a lifetime. In *Tutira: The Story of a New Zealand Sheep Station* (1921), Herbert Guthrie-Smith recorded in meticulous, vivid detail the ecological changes that accompanied the introduction of livestock husbandry to the North Island of New Zealand, and in particular the "invasion" of alien species as colonial agriculture transformed the environment.[14] Like Darwin, Marsh, and many others, Muir and Guthrie-Smith were amateur natural historians; but like Darwin and Marsh, their worked anticipated and influenced professional scholars later on, including those who studied and wrote about national park landscapes.

Beginning in 1916, William Skinner Cooper (no relation to David Cooper), a botanist with a PhD from the University of Chicago, conducted fieldwork at Glacier Bay, Alaska, where he observed evidence of vegetation destruction and "reinvasion" as glaciers advanced and retreated. In "The Recent Ecological History of Glacier Bay, Alaska" (1923), Skinner Cooper drew on his fieldwork and a range of historical sources, including a field reconnaissance by John Muir, to advance a historical argument: "I aim to lay emphasis upon the fact of unceasing change as the fundamental basis of vegetational study, a thesis that is unusually plain in the present case, but true universally."[15] Not only was Skinner Cooper an astute scientist, he was a conservationist who led other scientists in urging President Calvin Coolidge to establish a national monument at the site, which Coolidge did in 1925. Because of Skinner Cooper's efforts, his admirers referred to him as "the father of Glacier Bay National Monument." In 1956, further demonstrating the intellectual eclecticism characteristic of natural historians, he authored *A Contribution to the History of Glacier Bay National Monument*, an account of the monument's founding.[16]

As the 20th century unfolded, more and more natural history scholars were, like Skinner Cooper, academically trained professionals with advanced degrees in fields such as biology,

geography, anthropology, and history, but who nonetheless exhibited characteristics of the older interdisciplinary approach. "Ecology is a new name for a very old subject," Charles Elton wrote in *Animal Ecology* (1927). "It simply means scientific natural history." Elton sustained this point of view in subsequent works, such as *The Ecology of Invasions by Animals and Plants* (1958), which recalled the scholarship of Herbert Guthrie-Smith. In "The Morphology of Landscape" (1925), "Theme of Plant and Animal Destruction in Economic History" (1938), and numerous other writings, the geographer Carl Sauer carried forward themes first explored by Marsh. By the 1940s, the wildlife scientist Aldo Leopold developed research and teaching techniques in which he and his students combined information from the records of trappers, explorers, and settlers with scientific data to produce histories that would help them to assess the condition of specific landscapes. The historian James Malin similarly recalled the natural history tradition by combining detailed knowledge of climate, soils, and botany with his historical perspective in works such as *The Grassland of North America: Prolegomena to its History* (1947).[17]

In his sensitivity to the historical, religious, and aesthetic elements of science and scientific subjects, the ecologist G. Evelyn Hutchinson perhaps most strongly manifested the tradition of Humboldt. "[A]lthough not self-consciously 'Humboldtian,'" according to the historian of science Sharon Kingsland, Hutchinson "nonetheless approached science in a way that is strikingly similar to that of his great predecessor." Similarities to Humboldt might be read in "The History of a Lake," published in 1942: "A complete knowledge of the laws involved in the phenomena" that shaped the histories of lakes "might be of the greatest practical importance," because "a rational feeling for the equilibria involved must be inculcated into the minds of future men of affairs if we are ever to achieve that harmonious existence which alone will justify the evolutionary ascendancy of our species."[18] Scholars such as Elton, Sauer, Leopold, Malin, and Hutchinson did not follow the same lines of research, exactly, nor did they and their findings necessarily agree. But in their broad-based effort to understand environmental change, the interrelated human and nonhuman forces that caused that change, and the meaning of science and nature to humanity, they and others like them sustained a common interdisciplinary intellectual milieu.

Among those who were part of this natural history milieu, I would argue, were the national park scientists George Wright, Joseph Dixon, and Ben Thompson. All three studied at the University of California at Berkeley, under Joseph Grinnell, a biologist devoted to field work, the condition of wildlife in the national parks, and public education. While working for NPS at Yosemite, Wright discussed wildlife conditions with the naturalist Carl P. Russell, a biologist with an interest in the early American West who later authored meticulously researched histories of Yosemite, firearms, and the tools and implements of the fur trappers. It is possible that Russell influenced the approach to history that Wright laid out in *Fauna no. 1,* his survey of national park wildlife conditions. "Dr. Carl P. Russell, field naturalist," Wright and his colleagues acknowledged, "was instrumental in the original conception of the idea and has both inspired and advised the survey all along the way."[19]

The pinnacle, perhaps, of 20th-century natural history was the publication of a massive survey of planetary environmental change, *Man's Role in Changing the Face of the Earth* (1956). Dedicated to George Perkins Marsh and based on an international conference held

the year before its publication, the book featured dozens of papers on the many ways that humankind had altered soil, water, animals, plants, and other features of the global environment. Authored by anthropologists, ecologists, historians, and especially geographers, it was an intellectual extravaganza that illustrated the interdisciplinary approach to environmental change that had become the hallmark of natural history. The breadth that characterized the book and its authors—the geographer Carl Sauer, the ecologists Marston Bates, Frank Fraser Darling, and Paul Sears, the planner, architectural critic, and historian Lewis Mumford, the historian James Malin, the anthropologist Omer Stewart, the hydrologist Luna Leopold, and others—almost certainly typified many of its readers.[20] My copy, which I purchased for $1.50 at a book sale to benefit Colorado State University's Morgan Library, once belonged to Gordon W. Hewes, an anthropologist at the University of Colorado at Boulder. Hewes's expertise spanned a remarkable range of specializations, including ethnology, archaeology, linguistics, and physical anthropology, and according to his colleague Duane Quiatt, "he pursued anthropology as an eclectic and synthesizing discipline."[21]

Yet even as scholars such as Hewes acquired copies of *Man's Role in Changing the Face of the Earth*, natural history was in trouble. The disciplines that could be traced back to thinkers such as Humboldt, Darwin, and Marsh were entering a phase in which they were becoming exceedingly narrow, reductive, instrumental, and concerned with intellectual boundaries. Fearful of the taint of geographical determinism, geography retreated from its commitment to studying humankind's place in the environment and redefined itself as a spatial science.[22] To the extent that American historians invoked the environment, they often did so it in static, even deterministic, terms. Other historians retreated from environmental interpretations and focused on culture and politics while borrowing theoretical concepts from social sciences such as psychology.

Ecology, the science of the relationships among living things and their environments, more and more focused not on the historical processes that had produced specific landscapes, but on the use of mechanistic theoretical models from cybernetics, operations research, and systems analysis to statistically measure the cycling of material and energy through the "ecosystem." Sharon Kingsland has described a "growing divorce between modern ecology and natural history" as proponents of ecosystem science distanced themselves from an older method that they thought lacked rigor, was intellectually soft, and conferred low status.[23] Even scientists who worked within the natural history tradition, such as Evelyn Hutchinson, participated in the fragmentation and reduction of ecology to abstractions. Ironically, Hutchinson's very breadth and open-mindedness to new approaches, so typical of Humboldt, led him to the study of biogeochemical cycles and to support students and postdoctoral researchers who advanced daring interpretations based on that method. Thus even when Hutchinson wrote of the history of a lake, it was not a contingent history of a specific place, but rather a mechanistic history, largely if not totally devoid of people, which unfolded from underlying material laws.

Developments in the national parks and NPS also contributed to the waning of natural history. George Wright, who had subsidized the first scientific wildlife surveys in the NPS with his own money, died in an automobile collision in 1936 near Deming, New Mexico, on his way back to California after an official visit to Big Bend National Park in Texas. Weakened

by Wright's death, the New Deal's emphasis on national park infrastructure, the diversion of funds and labor to the World War II effort, and then the drive to accommodate millions of new visitors and enlarge the national park system during the postwar Mission 66 era, NPS's research program took decades to recover.[24]

Despite the trend toward intellectual reductionism and research specialization, versions of a holistic natural history persisted in the various disciplines. In agricultural history, a few scholars continued to concern themselves with climate, soil, plants, animals, forests, and human–land relationships. The idea of nature and the politics of conservation remained important to a small but important circle of scholars in various disciplines. A handful of students benefited from a propitious combination of circumstances and found advisers who helped them prepare graduate theses that harkened back to the approach pioneered by George Perkins Marsh. A native of Arizona, James Rodney Hastings earned a bachelor's degree in chemistry and English at the University of Chicago. During the late 1950s, he began graduate work in history at the University of Arizona. In 1963, Hastings completed his doctoral dissertation, "Historical Changes in the Vegetation of a Desert Region," a survey of environmental change in the Arizona borderlands (including Saguaro National Monument) that combined research in an astonishing range of primary source documents with the technique of repeat photography.[25]

Hastings's dissertation was a model of natural history. His bibliography cited an eclectic mix of science and history scholarship, including the work of the historians James Malin and Walter Prescott Webb, the geographer Carl Sauer (including Sauer's contribution to *Man's Role in Changing the Face of the Earth*), and the anthropologist Omer Stewart. Hastings listed some of his own scholarship, including one essay published in *Arizona and the West*, a history journal, and others in the *Journal of the Arizona Academy of Science.* Hastings credited the scientist James E. McDonald "for the initial idea, and for the early historical research." He also thanked A. Richard Kassander, director of the Institute for Atmospheric Physics, and Russell C. Ewing, chair of the History Department, for their help "in devising a suitable graduate study program out of the diverse materials of history, climatology and ecology, and steering the program through to completion." True to the natural history tradition, Hastings resisted the urge to attribute environmental change to either human or non-human "natural" factors. Rather, he took pains to point out the complexity and interdependency of causes. Hastings soon moved his dissertation to the next scholarly level when, in 1965, in collaboration with U.S. Geological Survey scientist Raymond Turner, he published *The Changing Mile: An Ecological Study of Vegetation Change with Time in the Lower Mile of an Arid and Semiarid Region*.[26]

Much as natural history persisted in academic scholarship, so did it continue, however diminished, in the thought and policies of NPS. Echoes of George Wright could be discerned, perhaps most importantly, in the famous Leopold Report of 1963. Referring to primary documents such as the diaries of gold rush miners, the Leopold Report took a historical perspective by observing that although environmental changes precluded returning park landscapes to their exact original condition at the moment of European contact, NPS might manage them to give visitors a feel for what they might have been like at that time. The goal

should be to present "a vignette of primitive America," a "reasonable illusion of primitive America."[27]

A related document on research in the national parks, authored by a National Academy of Sciences and National Research Council team that included natural history stalwarts Frank Fraser Darling and Marston Bates, and submitted in 1963, called on NPS to make "natural history" the basis of the agency's research program. "Each national park was established because of the potential esthetic, educational, and scientific and cultural values of its natural history and/or its human history.... Inventory and mapping of the natural history resources of each park should be made.... A permanent, independent, and identifiable research unit should be established within the National Park Service to conduct and supervise research in natural history in the national parks...."[28]

The Leopold Report and the National Academy of Sciences–National Research Council document revealed much about natural history and its problematic place in the national parks. Much as NPS did not pay for George Wright's research, it also did not pay for, or give much support to, the production of the Leopold Report. Congress funded the work, and non-NPS natural resource experts wrote it. Furthermore, the document authored by Darling and Bates et al., another non-NPS group, manifested an important shift in the meaning of natural history, in and out of the national parks. The document gave natural history a prominent place among its proposals and mentioned the term at least 14 times, but it also made clear that natural history was more the purview of science than of the humanities. It referred to "science," "scientific," "scientist," and the like at least 16 times, and it called for the creation of a key administrative position: chief scientist of the National Park Service. In contrast, the authors referred to "history," "archaeology," and "culture" only five times. Clearly, the human history in natural history was an afterthought.[29] The advisory bodies to NPS seemed to be thinking less in terms of history *per se* than in terms of science and the maintenance of ecological purity in the parks, understandable in light of the resource degradation in the parks in the face of massive population growth, industrialization, and vastly increased visitation. But the trend was evident: human history mattered less in NPS's natural history equation.

As the proponents of natural history kept its narrowed vestige alive while calling for its revival, opportunities arose for historians to reshape it in a new, up-dated form: environmental history. Historians like Samuel Hays, Elmo Richardson, and Roderick Nash, and the political scientist-cum-historian John Ise, had sustained an interest in the national parks, but their works had tended toward intellectual, cultural, policy, and economic history. By the 1970s, however, a group of younger historians, expressing the concerns of the environmental movement, began to adapt natural history, ecology, and geography to conventional historical scholarship in the study of environmental change in specific landscapes. The connection to past natural history scholars like George Perkins Marsh suddenly was strengthened.

An outstanding example of the new generation was my graduate school adviser, Richard White, who completed his doctorate in 1975 at the University of Washington under the direction of the agricultural and western American historian Vernon Carstensen. When White told Carstensen that he wanted to write a biography for his doctoral thesis, a crucial-

ly important intellectual transfer took place, a transfer that spanned some five decades and that, unbeknownst to White, linked him to the deep history of natural history. An "immensely curious and thoughtful" scholar who "read widely," Carstensen said that although a biography was possible, White might want to consider a wider array of topics. Toward that end, Carstensen suggested that White read none other than Herbert Guthrie-Smith's *Tutira: The Story of a New Zealand Sheep Station*. Guthrie-Smith's book became the model for White's dissertation, an "environmental history" (White's words) of Whidbey and Camano Islands in Washington's Puget Sound.[30]

Published in 1980 as *Land Use, Environment, and Social Change: The Shaping of Island County, Washington*, it became one of the foundational texts of the modern field of environmental history. White's research involved field observations of the island landscapes, his methodology borrowed heavily (and naively, he later thought) from ecosystem science, and his bibliography cited not only George Perkins Marsh, but the work of natural historians such as Marston Bates, Andrew Clark, John Curtis, Frank Fraser Darling, James Malin, and Carl Sauer, all of whom had contributed to *Man's Role in Changing the Face of the Earth*. White's paraphrase of Darling harkened back to an older natural history while calling on a current generation of historians to participate in the interdisciplinary study of the biophysical world: "Frank Fraser Darling, a leading ecologist, has called social history, political history, and natural history the three horses pulling the chariot of the study of human sociology and its relationship with the natural world. But historians have been reluctant to acknowledge their horses, much less harness them."[31]

As much as White owed to natural history, in important ways his work marked a major departure in its lineage. As a historian in the 1970s, White's work showed the influence, not only of more conventional political, policy, economic, and frontier histories, but also of the new social history, which was much more concerned with the lives and experiences of ordinary people—farmers, laborers, families, American Indians, and the like. Much more than did an older generation of natural historians, White took seriously the role of Indians and Chinese laborers in shaping the islands. White also placed much greater emphasis on the social systems, in particular capitalism, which he thought accounted for the degradation of island ecology. He also attended, not just to the environmental changes that people caused, but to the stories that influenced their actions and that they used to attach meaning to the changes that they witnessed.

In other ways, in particular his intense curiosity and fierce devotion to independent, interdisciplinary research into the causes of environmental and social change, White remained within the natural history lineage. Much as Carstensen served as the conduit for an older body of natural history work, White similarly passed on that knowledge to his students, and he added new work in geography and ecology to the reading lists of his graduate seminars and tutorials. While working on my own doctoral dissertation, White handed me a copy of *Land and Life* (1963), a compilation of writings by the geographer Carl Sauer. White had underlined key passages in the text and written comments in the margins. In "Foreword to Historical Geography," he underscored a comment indicative of Sauer's refusal to be captured by disciplinary convention: "When a subject is ruled, not by inquisitiveness, but by definitions of its boundaries, it is likely to face extinction. This way lies the death of learn-

ing." A heavy black vertical line and words handwritten in the margin indicated White's emphatic agreement: "Good"—"use this."[32]

Other historians joined White in the wide-open, interdisciplinary effort that marked the formal inception of environmental history. In 1984, for example, Donald Worster, author of works on the history of ecology and the Dust Bowl, published "History as Natural History: An Essay on Theory and Method," which harkened back to an older tradition while pointing forward to a new kind of scholarship. "Evolution and history remain, after a hundred years," Worster wrote, "separate realms of discourse," and he called on historians to overcome the disciplinary fragmentation that had relegated their craft to "an archival pursuit" with "less and less dirt on it." He pointed to anthropology as the model of a discipline that had engaged the ecological sciences, and said that an "ecological perspective" might "open our imaginations and let us look deeper into the past around us."[33]

Even as modern environmental history took shape in the work of scholars such as White and Worster, the older natural history emphasis remained alive among academic scientists who recognized its value. My Colorado State University colleague David Cooper inherited it from his doctoral adviser, John Marr, a plant ecologist and student of William Skinner Cooper who founded the Institute of Arctic and Alpine Research (INSTAAR) in 1951 at the University of Colorado at Boulder. Marr encouraged his students to think broadly, observe closely, and take into consideration all influences on the ecological conditions under study. He emphasized the importance of field observation and taught a method in which he took students to research sites and asked them a historical question: What particular events accounted for the differences in the vegetation patterns in the same area? One of his many protégés was Bettie Willard. The daughter of a landscape photographer and painter who fostered her interest in nature, Willard built on her graduate training under Marr to study the impact of visitors on the alpine vegetation of Rocky Mountain National Park. Marr also transferred to students his knowledge of natural history scholarship. It was in one of his undergraduate ecology classes during the 1970s that David Cooper first read "The Recent History of Glacier Bay, Alaska" and other writings of William Skinner Cooper.[34]

From these intellectual influences, Cooper began to fashion a scientific career rooted in natural history and connected to the national parks. Prompted by his historical imagination, he went to the remote interior of Alaska to see a landscape that might give him an impression of undeveloped nature before the time of industrialization. In the summer of 1977, he spent 36 days backpacking and rafting by himself in Alaska's Central Brooks Range, an area that within two years became Gates of the Arctic National Monument, and to which he later returned to conduct field research for his doctoral dissertation. Even before completing that work, with the encouragement of John Marr, his adviser, he did something that tied him to the humanistic side of natural history as exemplified by writers such as John Muir, Robert Marshall, Lois Crisler, and Margaret Murie: in 1982, he authored *Brooks Range Passage*, an account of his solo journey five years before.[35] And although his dissertation, "Arctic–Alpine Ecosystems of the Arrigetch Creek Valley, Central Brooks Range, Alaska" (1983), did not draw directly on Skinner Cooper's work, it did reflect Cooper's interest in "the scale of landscape change and process" that became the basis of his scientific work in national parks and other places.[36]

Cooper's nearly three decades of research in national parks like Gates of the Arctic, Yosemite, and Rocky Mountain highlighted some of the reasons why natural history remained important to the National Park Service even as it was falling out of favor among academicians interested in turning ecology into a hard science. NPS personnel had legal and administrative mandates to manage *specific* park landscapes. Understanding abstract ecological processes was important to park personnel, Cooper believed, but was secondary to the "synthetic scientific knowledge" that they needed to help them make "informed management decisions" about the places for which they were responsible. That knowledge, moreover, necessarily had to include evidence of "historic processes and connections and how they affected park landscapes and their sustainability." Over the years, Cooper appreciated more and more the necessity of understanding landscape history and the human role in it: trapping, burning, spraying, grazing, irrigating, and many other activities left marks on park landscapes still evident a century and more later. "What's the history of this place?" he thought, should be the first question asked in a research project, not the last.[37]

Although Cooper was surprised that many scientists, including some who worked in the parks, didn't grasp the significance of the question, there were many others like him who did. Again, perhaps one example might suffice to show the persistence of natural history in the parks and its convergence with the more recent field of environmental history. In 1998, two NPS scientists, Mary Meagher and Douglas Houston, published *Yellowstone and the Biology of Time: Photographs across a Century*, a work inspired by specific management problems (fire, grazing, visitation pressure, and the like) and, in its use of primary sources and repeat photography, much in the mold of Hastings' and Turner's *The Changing Mile*. Of the two authors, Meagher most seemed to fit the model of the natural historian. She had begun her career at Yellowstone as a museum curator, a position in which she learned to appreciate "the biological information to be gleaned from the early years of park history" and in particular from the park's collection of historic photographs. "Her interest in what is now the field of environmental history," furthermore, "intensified during her studies of bison because of the need for information on vegetation trends for their winter ranges." Not only did Meagher and Houston cite the work of historians, but their bibliography also included titles—"Rangeland through Time," "Historical Perspective on the Yellowstone Fires of 1988," "A History of Fish Stocking Activities in Yellowstone National Park"—that revealed how much national park scientists had tried to think historically about their subject matter.[38]

While scientists such as Cooper, Meagher, and Houston used history as an analytical tool, other NPS personnel did their part to sustain a link to an older natural history tradition and to bring to the fore the perspective of environmental history. The institutional and disciplinary obstacles they faced should not be minimized. NPS remained primarily devoted to tourism. As a consequence, the agency stressed the importance of landscape architecture as a tool for managing park landscapes and accommodating visitors. The conventional organizational divide between nature and culture—between natural resources management and cultural resources management—also constrained interdisciplinary work, as did the dominance of natural resource managers in large parks conventionally considered to be primarily natural. Nonetheless, in contrast to other federal land management agencies, NPS remained extraordinarily diverse in the disciplinary training of its personnel, and this helped keep

open opportunities for the revival of natural history and the fostering of the "new" environmental history.

Indeed, the range of NPS expertise strongly resembled that of the liberal arts and natural sciences typical of a college or university. NPS interpreters, for example, synthesized knowledge from history, philosophy, art, and the social and natural sciences, and organized it in presentations that, ideally, provoked the imaginations of non-specialist park visitors. The writer and unofficial NPS philosopher Freeman Tilden described interpretation's holism in *Interpreting Our Heritage* (1957), a manual that drew on the thought of Ralph Waldo Emerson, one of Alexander von Humboldt's American disciples. "Interpretation is an art," Tilden wrote, "which combines many arts, whether the materials presented are scientific, historical or architectural.... Interpretation should aim to present a whole rather than a part, and must address itself to the whole man rather than any phase."[39] Archaeologists, cultural anthropologists, geographers, and landscape architects also brought distinctive but complementary perspectives to the problem of landscape change and the human role in it. The college-like gathering of disciplines within NPS did not ensure that historians, scientists, and other personnel would collaborate, but organizational relationships and spatial proximity certainly made it possible. In turn, that intellectual cross-fertilization helped to create opportunities for historians, scientists, and other experts to come together under the new rubric of environmental history.[40]

An important development in this regard occurred in the 1980s and 1990s, when NPS began to pay greater attention to parks primarily devoted to human activities and history.[41] These "cultural landscapes"—Civil War battlefields and agricultural settlements, for example—often contained non-human components, such as forests, prairies, soils, watersheds, and wildlife. Landscape architects worked with historians to develop the "cultural landscape study," an analysis of the distribution, condition, and history of human landscape features in relation to the non-human natural fundament. Trained to assess relationships between human and non-human forms and processes, landscape architects had been important to the national parks going back to Frederick Law Olmsted in the nineteenth century.[42] Their perspective opened them to the possibilities of environmental history, and they incorporated the field's insights into their study of places like Ebey's Landing National Historical Reserve, a rural landscape of some 19,000 acres on Whidbey Island in Washington State's Puget Sound. A "vernacular landscape" that embodied patterns of settlement ranging from that of coastal Salish Indians to modern tourists, Ebey's Landing "illustrates," NPS stated, "a continuous history of human interaction with the environment." A key text that informed NPS study of the site was Richard White's *Land Use, Environment, and Social Change: The Shaping of Island County, Washington*.[43]

While landscape architects applied environmental history to cultural landscape studies, historians and other agency personnel developed the field and introduced their colleagues in science and natural resource management to it. Some of this work grew from first-hand experience in the national parks. At the Grand Canyon during the 1970s, Stephen Pyne, a young NPS firefighter with an academic background in literature and geology, began to think about the combined human and non-human history of fire. Over some 30 years, he produced an astonishing range of fire histories that he called "the cycle of fire." In turn, Pyne and other

scholars influenced new generations of environmental historians. One of the most prolific and influential was Hal Rothman, who, along with his colleagues and students, produced a plethora of national park studies. *Blazing Heritage: A History of Wildland Fire in the National Parks* (2007), his last major work published during his lifetime, built on Pyne's efforts.[44] Other environmental historians provoked controversy. William Cronon and his students, for example, called into question the cultural premises of wilderness and their application to protected areas such as the national parks. In "The Riddle of the Apostle Islands: How Do You Manage a Wilderness Full of Human Stories?" (2003), Cronon criticized the general predilection of the NPS not to interpret the human presence in wildlands, but praised Bob Krumenaker, the park's superintendent, "as both visionary and eloquent in refusing to choose wilderness over history—or history over wilderness."[45]

Environmental history also entered NPS along fortuitous administrative lines. In the mid-1990s, NPS historian Bob Spude was deputy of the Office of Ecosystem Management for the Rocky Mountain Region, a seemingly unlikely assignment for a historian. As part of a project to assess natural resource issues at Great Sand Dunes National Monument, Spude proposed an environmental history. In consultation with Superintendent Bill Wellman and NPS hydrologist Mark Chatman, he prepared a briefing paper, "What is Environmental History? And What Are Its Uses for Land Managers?" The document listed a range of research questions about the history of vegetation, fire, and other land uses, and changes in hydrology and wetlands at Great Sand Dunes. Running through each of those questions was the deeper issue of the extent to which human influences on the landscape could be disentangled from non-human ones. Spude then revised the paper into a plan according to which Michael Geary, a history graduate student at Colorado State University, prepared an environmental history of the monument. Geary first worked with National Biological Service scientists Cliff Martinka and Peter Rowlands on a rephotographic survey of monument landscapes, and then he conducted additional research and wrote the environmental history. My Colorado State University colleague John Albright (a retired NPS historian) and I supervised his work.[46]

Spude's briefing paper made ample references to Richard White and other academic environmental historians, but he also cited the work of NPS historian Richard West Sellars. At that time, Sellars was writing a history that would be critical of NPS scientific research and natural resource policies. Published in 1997 as *Preserving Nature in the National Parks*, the book engendered considerable debate and discussion in and outside of NPS and stimulated support for the Natural Resource Challenge, a program funded by Congress and intended to reinvigorate scientific research in the national parks.[47]

In attempting to reinvigorate science, however, the Natural Resource Challenge also opened opportunities for additional research in environmental history. Some NPS scientists had little or no connection to the older natural history tradition, and they were intrigued with the possibilities that they saw in environmental history. One was Rob Bennetts, an ecologist working for the NPS Southern Plains Area Network and stationed at New Mexico Highlands University. Bennetts had earned a PhD in wildlife ecology at the University of Florida and had worked for various state and federal agencies before transferring to NPS in 2002. Like

other people in his field, he had become disenchanted with reductive, statistically driven methodologies. Too many scientists had become "lost in the numbers" and discounted qualitative evidence gathered from field observation. Working at national park historic sites, however, sensitized Bennetts to the ways that "historical context, not just ecological process," explained what he saw on the land.[48]

Then, in 2008, Bennetts read an environmental history of Sand Creek Massacre National Historic Site. Such an approach, he thought, might help NPS see and manage its landscapes more holistically, overcoming reductive methodologies and bureaucratic divisions that separated nature and culture. That year, working with Superintendent Kathy Billings, he began to arrange an environmental history project at Pecos National Historical Park, a site that combines a unique collection of cultural landscapes within some 6,670 acres of grassland and pinyon–juniper forest at the headwaters of the Pecos River. An environmental history of Pecos, he believed, might provide a means to bridge various disciplines and agency responsibilities and lay the basis for a more integrated approach to resource planning and management.[49]

By the time Bennetts was delving into environmental history, NPS personnel and their academic partners elsewhere in the nation were adapting it to research, planning, and management. NPS was hiring environmental historians and putting them to work on the parks' many problems. Through the Cooperative Ecosystems Studies Units program and other means, NPS was involving academic environmental historians in the production of knowledge important to park management, which is how I became involved in the parks, and which is how I met Bob Spude, Ben Bobowski, David Cooper, Rob Bennetts, and other national park personnel and researchers.

In effect, natural history was coming full circle in NPS. Academic divisions, methodological reductions, and bureaucratic compartmentalization were weakening in the face of problems that required resource managers and their partners to think as broadly, flexibly, and historically as possible. The need to understand changing environmental conditions in specific park landscapes oriented field scientists like David Cooper more than ever to history, and some, like Mary Meagher, went into the archives. Meanwhile, environmental problems awakened historians to the importance of nature and compelled them to head outdoors in search of evidence on the land. Richard White recalled that his doctoral research "involved at least as much time feeling out the seasonal changes and the textures of the coasts, fields, and forests of Whidbey Island as it did time in the archives and library."[50] To a scientist like Rob Bennetts or a historian like me, this convergence could seem new, but in many ways it was a revival of a method that harkened back to the time of Humboldt and Darwin and probably before.

The new synthesis, now called environmental history, is not exactly the same as the older natural history. As practiced by academic historians, environmental history has features that distinguish it from its roots and make it unlike natural science. Although scientists rightly look to environmental historians for help in understanding land management problems, environmental history is more than an instrumental technique—it is more than just another tool in the scientist's and resource manager's toolbox. The influence of social history on

environmental history is more profound than historians of these fields probably realize, and it has made environmental historians as concerned with the human communities in the land as with the land itself.

Here it is worth recalling George Wright and *Fauna no. 1*. Evidently there is no reason to believe that Wright was anything but a deeply humane and sensitive man. Seeking information about Yosemite's wildlife, Wright and Ben Thompson went to Maria Lebrado, an elderly Native woman, and spoke to her in Spanish. A photograph of Wright and Lebrado, only a portion of which appeared in *Fauna no. 1*, shows the young man listening intently as the elder Lebrado, forefinger upraised, makes a point.[51] Yet Wright's primary purpose was not to reconstruct a past in which the lives of Yosemite's human and non-human inhabitants were intertwined and in which the fate of wildlife was related to European Americans' efforts to remove Native people from the land. Rather, his purpose was to reconstruct a history centered on animals.[52] The scientist's desire to understand flora and fauna and the historian's need to place people in the story makes up a huge portion of the 25% difference that, in the judgment of my colleague David Cooper, separates them.

If national park scientists and historians wish to overcome that 25% and realize the potential of environmental history as a core NPS methodology, they need to think about how to practice their disciplines in more complementary ways. Scientists need to understand that history is not just an instrumental technique, another tool in the toolkit, but a method that of necessity introduces the human element, and not necessarily as a destructive force exogenous to a natural order. As Joseph E. Taylor wrote, "establishing a natural condition is not simply an ecological but a cultural equation.... As historians note over and over, every conservation battle has been a struggle over which nature and whose nature would be conserved." Scientists also should consider that the discipline of history requires a deep knowledge of context, the ability to understand the complexities and limitations of documentary evidence, and the skill to convey findings in analytically *and* aesthetically compelling narratives, or "stories."[53]

Historians, for their part, need to develop a renewed respect for the analytical power of science. They ought to think about the ways that their discipline, no less than science, is culture-bound, politicized, and compromised by a colonial past. They need to listen to scientists and tailor their research questions accordingly, and they need to commit themselves to the national parks as deeply as do scientists. They also must try to overcome their disciplinary aversion to working in teams and learn to collaborate as scientists do. For all their fascination with groups as subject matter, historians are the most radical of individualists, and their individualism does not serve their interests or the interests of science and the national parks particularly well. The world is changing, and too much is at stake for historians not to reach out to others whose values they share.

Finally, both scientists and environmental historians should think about how to use their 75% overlap to shrink if not eliminate the remaining 25% that separates them. As the historian John L. Gaddis observed in *The Landscape of History*, historians share with scientists, in particular ecologists, an interest in complexity and a desire to map the multiple, interacting variables that produce change over time.[54] Above all, scientists and historians must think about their shared roots in natural history, and how both groups at heart are Humboldtians

who wish to arrive at that "harmonious existence," as Evelyn Hutchinson said, "that alone will justify the evolutionary ascendancy of our species."

As important as it is, the remaining 25% difference is surmountable—or, at least, negotiable, and we need look no further than George Wright and our friends and colleagues to see evidence of this. Ten years ago, David Harmon suggested that Wright "would have been quick to realize that the human presence in natural landscapes is of long standing and has its own value."[55] Similarly, I see no evidence that David Cooper is unconcerned with social justice or the fate of democracy; quite the contrary. It's just that his immediate concerns center on NPS's mandate to preserve the plants and animals in its care. If historians wish that scientists and resource managers would think about people as more than simply a destructive force in the landscape, it is equally fair that historians fulfill the scientists' and managers' wish that we help them to rescue and conserve our precious nonhuman natural heritage. In the future, environmental history might become the intellectual ground on which national park researchers—scientists, historians, and others—negotiate and renegotiate their differences as they work toward goals that unify them and that are much more important than the particular ways they see the world. That future, rather than environmental history *per se*, truly will be new.

Endnotes

1. Michael M. Geary, "Ramparts of Sand: An Environmental History of Great Sand Dunes National Monument and the San Luis Valley" (M.A. thesis, Colorado State University, 1997); Rose Laflin, *Irrigation, Settlement, and Change on the Cache la Poudre River* (Fort Collins: Colorado Water Resources Research Institute, Colorado State University, 2005); Elizabeth Michell, *Sand Creek Massacre Site: An Environmental History* (Fort Collins: Colorado State University Department of History for National Park Service, 2007); Cori Knudten and Maren Bzdek, *Crossroads of Change: An Environmental History of Pecos National Historical Park* (Fort Collins: Public Lands History Center, Colorado State University, 2010).
2. Richard White, "American Environmental History: The Development of a New Historical Field," *Pacific Historical Review* 54 (August 1985): 297–335.
3. George W. Wright, Joseph S. Dixon, and Ben H. Thompson, *Fauna of the National Parks of the United States: A Preliminary Survey of Faunal Relations in National Parks* (Washington, DC: Government Printing Office, 1933), 17.
4. Mark Fiege, Notebook no. 1, 2010, author's possession (hereafter Fiege, Notebook no. 1, 2010).
5. Mark Fiege and Maren Bzdek, interview with Ben Bobowski, 5 November 2009, Beaver Meadows Visitor Center, Rocky Mountain National Park, Colorado, notes at Public Lands History Center, Colorado State University, Fort Collins. See also Benny R. Bobowski, "Rangeland Resources Monitoring: Concepts and Practical Applications" (PhD dissertation, Utah State University, 2001).
6. See Janet Browne, "Natural History," in *The Oxford Companion to the History of Modern Science*, ed. J.L. Heilbron (New York: Oxford University Press, 2003), 559–563.
7. My interpretation owes much to the influence of David Lowenthal, and I thank Profes-

sor Lowenthal for sharing with me his draft manuscript "From Scientism to Humanism: Reuniting Science with the Arts and Humanities," February 2010. On the matter of disciplinary breadth, I do not deny that biology, geography, and other disciplines are broad and synthetic, but to assert that all disciplines are the same in breadth and capacity for synthesis would be to beg the question of why academic history became the home of environmental history. Perhaps it is enough to conclude that historians asked broad questions, drew on a diversity of sources, and pulled together their findings in compelling narratives that found sizeable audiences. For an example of such a work, see William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983).

8. Laura Dassow Walls, *The Passage to Cosmos: Alexander von Humboldt and the Shaping of America* (Chicago: University of Chicago Press, 2009), 8.
9. Alexander von Humboldt, *Cosmos: A Sketch of the Physical Description of the Universe*, vol. 1, trans. Elise C. Otté (New York: Harper and Brothers, 1858; reprint edition, Baltimore: Johns Hopkins University Press, 1997), 7. The original German edition was published in 1845.
10. Walls, *Passage to Cosmos*, 210–323; and Aaron Sachs, *The Humboldt Current: Nineteenth Century Exploration and the Roots of American Environmentalism* (New York: Viking, 2006).
11. Charles Darwin, *The Origin of Species by Natural Selection*, ed. J.W. Burrow (London: John Murray, 1859; reprint edition, London: Penguin, 1968), quotations 435, 456. See also Edmund Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth* (New York: Cambridge University Press, 2011), for a work that connects history and science to recover natural history's lost potential.
12. Walls, *Passage to Cosmos*, 237 (quotations); George Perkins Marsh, *Man and Nature; Or, Physical Geography as Modified by Human Action*, ed. David Lowenthal (New York: Charles Scribner, 1864; reprint edition, Cambridge: Harvard University Press, 1965), 36 (quotation).
13. John Muir, *The Mountains of California* (San Francisco: Sierra Club Books, 1998), 15–109.
14. Herbert Guthrie-Smith, *Tutira: The Story of a New Zealand Sheep Station* (Seattle: University of Washington Press, 1999).
15. William Skinner Cooper, "The Recent Ecological History of Glacier Bay, Alaska: I. The Interglacial Forests of Glacier Bay," *Ecology* 4 (April 1923): 93–128 (quotation 94); William Skinner Cooper, "The Recent Ecological History of Glacier Bay, Alaska: II. The Present Vegetation Cycle," *Ecology* 4 (July 1923): 223–246; William Skinner Cooper, "The Recent Ecological History of Glacier Bay, Alaska: III. Permanent Quadrats at Glacier Bay: An Initial Report upon a Long-Period Study," *Ecology* 4 (October 1923): 355–365.
16. William Skinner Cooper, *A Contribution to the History of the Glacier Bay National Monument* (Minneapolis–St. Paul: University of Minnesota Department of Botany, 1956).
17. Charles Elton, *Animal Ecology* (London: Sidgwick and Jackson, 1927; reprint edition, Chicago: University of Chicago Press, 2001), 1 (quotation); Charles S. Elton, *The Ecol-*

ogy of Invasions by Animals and Plants (London: Methuen, 1958; reprint edition, Chicago: University of Chicago Press, 2000); Carl Sauer, *Land and Life: A Selection from the Writings of Carl Ortwin Sauer*, ed. John Leighly (Berkeley: University of California Press, 1963); Julianne Lutz Newton, *Aldo Leopold's Odyssey* (Washington, DC: Island Press, 2006), 327–336; James C. Malin, *History and Ecology: Studies of the Grassland*, ed. Robert P. Swierenga (Lincoln: University of Nebraska Press, 1984), xiii–xxix.

18. Sharon Kingsland, "The Beauty of the World: Evelyn Hutchinson's Vision of Science," in *The Art of Ecology: Writings of G. Evelyn Hutchinson*, ed. David K. Skelly, David M. Post, and Melinda D. Smith (New Haven: Yale University Press, 2010), 2; G. Evelyn Hutchinson, "The History of a Lake," *Yale Scientific Magazine* 16 (May 1942): 13–15, 22, republished in Skelly et al., eds., *Art of Ecology*, 134–137 (quotation 137). See also Nancy G. Slack, "From English Schoolboy to America's Foremost Ecologist," in Skelly et al., eds., *Art of Ecology*.
19. Wright et al., *Fauna of the National Parks of the United States*, iv.
20. William L. Thomas, Jr., ed., *Man's Role in Changing the Face of the Earth* (Chicago: University of Chicago Press, 1956).
21. See Quiatt's obituary at http://www.people.fas.harvard.edu/~witzel/MT30.HTM (accessed August 26, 2010).
22. See, for example, geographer Robert M. Wilson's "Retrospective Review: *Man's Role in Changing the Face of the Earth*," *Environmental History* 10 (July 2005): 564–566.
23. Sharon E. Kingsland, *The Evolution of American Ecology, 1890–2000* (Baltimore: Johns Hopkins University Press, 2005), 155–231 (quotation 218).
24. See, for example, Richard West Sellars, "The Rise and Decline of Ecological Attitudes in National Park Management, 1929–1940," *The George Wright Forum* 10, no. 1 (1993): 55–77.
25. James Rodney Hastings, "Historical Changes in the Vegetation of a Desert Region" (PhD dissertation, University of Arizona, 1963); Raymond M. Turner, Robert H. Webb, Janice E. Bowers, and James Rodney Hastings, *The Changing Mile Revisited: An Ecological Study of Vegetation Change with Time in the Lower Mile of an Arid and Semiarid Region* (Tucson: University of Arizona Press, 2003), xi–xvi, 323–324.
26. Hastings, "Historical Changes in the Vegetation of a Desert Region," v–xi (quotations ix, x), xxiii–xxxix, 433-456; James Rodney Hastings and Raymond M. Turner, *The Changing Mile: An Ecological Study of Vegetation Change with Time in the Lower Mile of an Arid and Semiarid Region* (Tucson: University of Arizona Press, 1965). Hastings' and Turner's work was updated in 2003 in Turner et al., *The Changing Mile Revisited.*
27. A.S. Leopold, S.A. Cain, C.M. Cottam, I.N. Gabrielson, T.L. Kimball, "Wildlife Management in the National Parks," March 4, 1963, in *America's National Park System: The Critical Documents*, ed. Lary M. Dilsaver (Lanham, MD: Rowman and Littlefield, 1994), 239–240.
28. National Academy of Sciences–National Research Council, "A Report by the Advisory Committee to the National Park Service on Research," 1963, in *America's National Park System*, ed. Dilsaver, 256–257.
29. National Academy of Sciences–National Research Council, "A Report by the Advisory

Committee to the National Park Service on Research," 253–262.

30. Richard White to author, 17 June 2010, email in author's possession. See also Richard White, "Vernon Carstensen," in *The New Encyclopedia of the American West*, ed. Howard Lamar (New Haven: Yale University Press, 1998), 167–168.
31. Richard White, *Land Use, Environment, and Social Change: The Shaping of Island County, Washington* (Seattle: University of Washington Press, 1980; reprint edition, Seattle: University of Washington Press, 1992), xvii–xix, 8 (quotation), 214–226.
32. Sauer, *Land and Life,* 355, copy in author's possession.
33. Donald Worster, "History as Natural History: An Essay on Theory and Method," *Pacific Historical Review* 53 (February 1984): 1–19. See also Russell, *Evolutionary History*. For an example of an ecologist adapting his field to history, see Norman L. Christensen, "Landscape History and Ecological Change," *Journal of Forest History 33* (July 1989): 116–125.
34. Kathleen Salzberg, Nan Elias, and Polly Christiansen, eds., *50th Anniversary: The Institute of Arctic and Alpine Research, 1951–2001* (Boulder: University of Colorado, 2001) is devoted to Marr and his students. On Willard, see Intermountain Region Museum Services Program, *Bettie Willard Collection Finding Aid, Rocky Mountain National Park* (Tucson: National Park Service, 2007), and Beatrice E. Willard and John W. Marr, "Effects of Human Activities on Alpine Tundra Ecosystems in Rocky Mountain National Park, Colorado," *Biological Conservation* 2 (July 1970): 257–265. On Cooper, see David Cooper to author, 26 July 2010, email in author's possession (hereafter Cooper to author); and Fiege Notebook no. 1, 2010.
35. David J. Cooper, *Brooks Range Passage* (Seattle: The Mountaineers, 1982), 8–11, 13–19, 205.
36. David J. Cooper, "Arctic–Alpine Tundra Ecosystems of the Arrigetch Creek Valley, Central Brooks Range, Alaska" (PhD dissertation, University of Colorado–Boulder, 1983); Cooper to author (quotation).
37. Fiege, Notebook no. 1, 2010.
38. Mary Meagher and Douglas B. Houston, *Yellowstone and the Biology of Time: Photographs across a Century* (Norman: University of Oklahoma Press, 1998), xiii (quotations).
39. Freeman Tilden, *Interpreting Our Heritage* (Chapel Hill: University of North Carolina Press, 1957; revised edition 1977), 9.
40. See, for example, Nora Mitchell and Susan Buggey, "Protected Landscapes and Cultural Landscapes: Taking Advantage of Diverse Approaches," *The George Wright Forum* 17, no. 1 (2000): 35–46; Brenda Barrett and Nora Mitchell, "Stewardship of Living Landscapes," *The George Wright Forum* 20, no. 2 (2003); 5–7; Daniel N. Laven, Nora J. Mitchell, and Deane Wang, "Examining Conservation Practice at the Landscape Scale," *The George Wright Forum* 22, no. 1 (2005): 5–9.
41. Katherine Ahern, *Cultural Landscape Bibliography: An Annotated Bibliography of Resources in the National Park System*, ed. Leslie H. Blythe and Robert R. Page (Washington, DC: National Park Service, 1992),vii; Robert Z. Melnick, *Cultural Landscapes: Rural Historic Districts in the National Park System* (Washington, DC: National Park

Service, 1984); Arnold R. Alanen and Robert Z. Melnick, eds., *Preserving Cultural Landscapes in America* (Baltimore: Johns Hopkins University Press, 2000).

42. Frederick Law Olmsted, *Yosemite and the Mariposa Grove: A Preliminary Report, 1865* (Yosemite National Park, CA: Yosemite Association, 1995); Ethan Carr, *Wilderness by Design: Landscape Architecture and the National Park Service* (Lincoln: University of Nebraska Press, 1999).
43. Ahern, *Cultural Landscape Bibliography*, 73.
44. See, for example, Stephen J. Pyne, *Fire on the Rim: A Firefighter's Season at the Grand Canyon* (New York: Weidenfeld and Nicolson, 1989), and Hal K. Rothman, *Blazing Heritage: A History of Wildland Fire in the National Parks* (New York: Oxford University Press, 2007).
45. William Cronon, "The Riddle of the Apostle Islands: How Do You Manage a Wilderness Full of Human Stories?" *Orion* (May–June 2003): 36–42.
46. Bob Spude to author, 26 February 2010, email in author's possession; Bob Spude, "Draft Notes on What is Environmental History? And What Are Its Uses for Land Managers?" (quotations), and "Great Sand Dunes National Monument Environmental History Proposal," both ca. 1994–1995 and in Spude's possession; Geary, "Ramparts of Sand."
47. Richard West Sellars, *Preserving Nature in the National Parks: A History* (New Haven: Yale University Press, 1999); Michael Soukup, "Integrating Science and Management: Becoming Who We Thought We Were," *The George Wright Forum* 24, no. 2 (2007): 26–29.
48. Fiege, Notebook no. 1, 2010; Robert E. Bennetts, "The Demography and Movements of Snail Kites in Florida" (PhD dissertation, University of Florida, 1998).
49. Knudten and Bzdek, *Crossroads of Change.*
50. White, *Land Use, Environment, and Social Change*, xvii–xviii.
51. David Harmon, "George Wright's Vision: What Does It Mean Today?" *The George Wright Forum* 17, no. 4 (2000): 10–11; Jerry Emory and Pamela Wright Lloyd, "George Melendez Wright, 1904–1936: A Voice on the Wing," *The George Wright Forum* 17, no. 4 (2000): 21.
52. See Mark Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999).
53. Joseph E. Taylor III, "Time and Nature," *Rural Connections* (May 2010): 23–26 (quotation 24); William Cronon, "A Place for Stories: Nature, History, and Narrative," *Journal of American History* 78 (March 1992): 1347–1376.
54. John L. Gaddis, *The Landscape of History: How Historians Map the Past* (New York: Oxford University Press, 2004), 1–109, esp. 53–56.
55. Harmon, "George Wright's Vision," 11.

Mark Fiege, Public Lands History Center, Department of History, Colorado State University, Fort Collins, Colorado 80523; mark.fiege@colostate.edu

The Need for Legible Landscapes: Environmental History and NPS Management at Apostle Islands National Lakeshore

James W. Feldman

In 1930, the US National Park Service dispatched landscape architect Harlan Kelsey to the far northern tip of Wisconsin to assess the Apostle Islands as a potential national park. Civic and business leaders from the surrounding towns had requested the evaluation, and they hoped that a favorable report from Kelsey would lead to the creation of a national park and the solution to a worrisome early-Depression economic question: what would replace logging at the heart of the region's economy as timber resources ran out and sawmills shut down? Kelsey was not impressed with what he found. "What must have been once a far more striking and characteristic landscape of dark coniferous original forest growth has been obliterated by the axe followed by fire," he reported. "The ecological conditions have been so violently disturbed that probably never could they be more than remotely reproduced." Kelsey concluded that destructive logging practices of the previous half-century had robbed the islands of their value to the Park Service and that "the project does not meet National Park Service standards." Kelsey's comments effectively destroyed any chance that the Apostle Islands would become a national park.[1]

But Kelsey was wrong, at least in his assessment of the area's future. In 1970, Congress established 21 of the 22 islands as Apostle Islands National Lakeshore (AINL). Kelsey would no doubt have been shocked to learn that the "primitive conditions" and "wilderness character" of the islands provided the primary motivation for the creation of the park. Indeed, when NPS administrators published the lakeshore's first management plan, they determined that the vast majority of the park should be managed as a wilderness.

The Apostle Islands certainly seem like wilderness today. Little evidence of the logging that so disturbed Harlan Kelsey remains evident to the casual observer. A rich forest mosaic covers the islands, including several areas of old growth—among the only remnant stands of old growth in the western Great Lakes. Empty beaches, delicate wetlands, and sandstone sea caves line the shores of the archipelago. Lake Superior envelops the islands, with its characteristically ferocious storms and magical sunsets. In November 2004, Congress designated 80% of the national lakeshore as the Gaylord Nelson Wilderness.[2]

The George Wright Forum, vol. 28, no. 2, pp. 148–160 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

Figure 1. Aerial view of the Apostle Islands, looking southwest from the Rocky Island sandspit. In 2004, Congress designated 80% of Apostle Islands National Lakeshore as the Gaylord Nelson Wilderness. Photograph courtesy of William Cronon.

How did a logging- and fire-scarred wasteland become a wilderness in just a few decades? The simple explanation is that the island forests regenerated after logging and other resource extraction, creating characteristics suitable for wilderness designation. But it would be a mistake to think of the return of wilderness as solely a natural process. Rather, the rewilding of the islands occurred because of the complicated ways that natural and human history intersected and molded each other. The forests regenerated in ways profoundly influenced by the history of human use. Ongoing human choices about how to value and use the islands shaped the rewilding of the islands, too. As the state—in the form of both the state of Wisconsin and the National Park Service—consolidated its authority in the region, it managed the islands to create a landscape valued for its recreational and scientific qualities, a landscape today called wilderness. Government land managers promoted some activities at the expense of others, isolating nature tourism from other economic activities in the islands. This segregation of the recreational uses of nature, and the land-use choices associated with this segregation, created the conditions necessary for rewilding.

By segregating nature tourism and recreation from other uses of nature, the National Park Service and other agencies, both federal and state, have made the environmental history of the islands difficult to find. Treating the islands as a wilderness, and only as a wilderness, has made it harder to see and understand the resource production activities of the past—the fishing, farming, and logging that shaped today's wild landscapes. Environmental history provides a context for understanding the past of wild places such as the Apostles. It

can help identify the individual choices about how to value, use, and manage island resources that shaped the modern wilderness as well as the social, political, and ecological conditions that constrained those choices. Environmental history also points towards ways of managing and interpreting these places in a manner that offers lessons about the consequences of human choices and the ongoing human role in the places we want to protect.

The identification of the Apostle Islands as a place for recreation and wilderness was the result of the attempts by land use managers to bring what might be called "legibility" to the environments of the Apostle Islands. Anthropologist and political scientist James C. Scott uses the concept of legibility, or simplification for easier state management, to explain practices as diverse as the creation of permanent last names, the drawing of maps, and the standardization of weights and measures. He explains each of these as a part "of the state's attempt to make a society legible, to arrange the population in ways that simplified … classic state functions." Efficient management required the simplification of complex social systems. This requirement intensified as the state became more powerful and more modern, and as the systems it sought to control grew more complicated.[3]

Although the state officials who managed the Apostles did not use the term "legibility," they applied its logic in their attempts to organize the islands for easier management. In the late 19th century, for example, officials working for the Wisconsin Fisheries Commission applied the principles of Progressive conservation to what they regarded as a chaotic and inefficient commercial fishery. They used closed seasons and equipment restrictions to limit and control who could fish, when and where they could do so, and how they could engage in market production. A 1909 regulation that all fishermen obtain a license represented a late step in this process. Licenses enhanced the ability of the state to manage both fishermen and fisheries. Fisheries experts could tabulate the number of fishermen, the equipment they used, and the types and amount of fish they caught. Licenses, in other words, made the fishery more legible.[4]

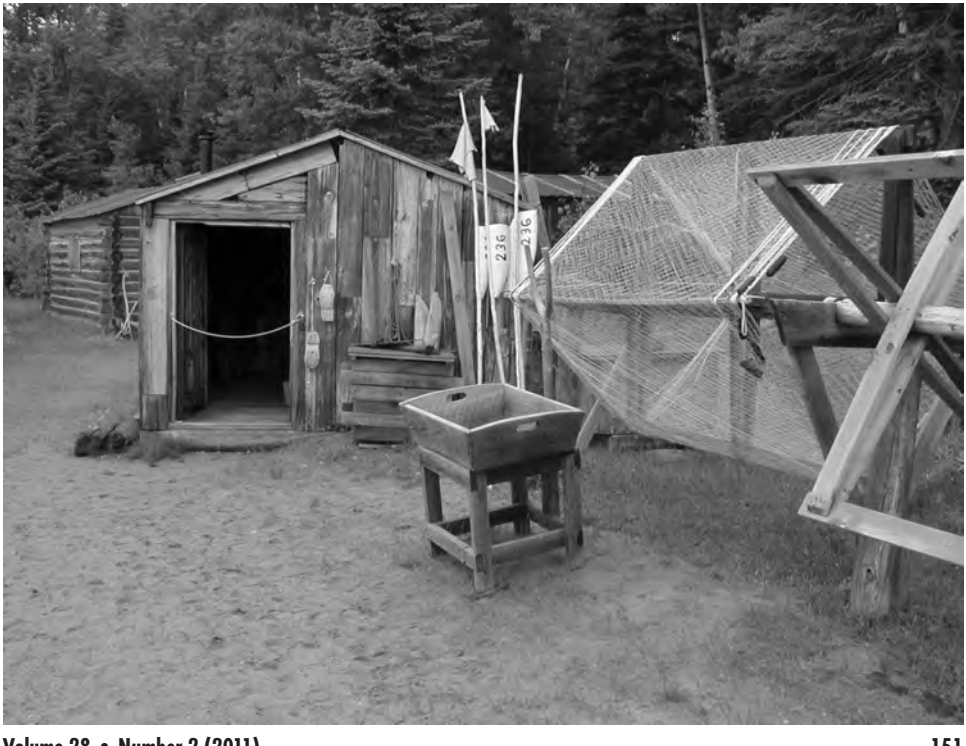
Over the course of the 20th century, officials from many levels of government allocated increasingly scarce resources in the Apostles, determining how those resources could be used to maximize goals such as nature protection, economic stability, and opportunities for outdoor recreation. One of the land manager's most effective tools for this purpose was the division of the landscape by use; specifying which activities could occur in any given area made the landscape more legible. In the Apostles, this process began in the 1930s, when the county government adopted rural zoning ordinances that classified most of the islands as suitable only for recreation and timber extraction. Permanent settlement, agriculture, and other uses were prohibited on all islands other than Madeline. Although logging continued in the islands until the 1970s, the segregation of the Apostles as a place valued for recreation had begun, a process that continued with the creation of AINL. The managers' need for legibility has had significant consequences for the ways that modern visitors see and understand the environments of the Apostle Islands and places like them. It has obscured the islands' history, and inhibited NPS from managing and interpreting the islands in a way that will bring out their most instructive and important legacies.

In the first management documents written after the designation of AINL in 1970, NPS planners began to apply a zoning system that was then becoming common across the Park

Service. In the 1960s and 1970s, NPS leaders placed a new emphasis on land classification and zoning. Although NPS had grown significantly in the postwar years, the agency faced sharp criticism from a variety of sources. The Outdoor Recreation Resources Review Commission (ORRRC) published a report in 1962 that criticized NPS management of recreational resources. Environmentalists complained that NPS focused too much on recreational development at the expense of nature protection. Agency planners hoped zoning would allow for more precise management of all kinds of resources—natural, cultural, and recreational. "In the master plan," one NPS official explained, "the best useful purpose for each portion of land is established. Some lands or waters are suitable and absolutely needed for intensive public use; others may accommodate only moderate use without damage and must be used cautiously, if at all." Through such planning and zoning measures, "the paradox between public use and preservation is resolved." To further this purpose, NPS adopted a land classification system recommended by the ORRRC.[5]

In accordance with this new emphasis, the 1971 *Master Plan* for AINL divided the islands into management zones. All but three of the islands were designated "Primitive," which meant that they would receive no development whatsoever. Sand, Rocky, and South Twin islands, as well as the mainland unit, were excluded from this category, ostensibly

Figure 2. The National Park Service maintains an active and effective cultural resource program, including the restoration and interpretation of this Manitou Island fish camp to its appearance in the 1930s. This program, however, reinforces the segregation between natural and cultural resources. Photograph courtesy of William Cronon.



because they had the most clearly visible human impact. These areas received the designation "Natural Environment," a category that permitted "trails, interpretive devices, an occasional picnic table, and other such low-key developments." The only exceptions to these two classifications were the quarry sites on Stockton and Basswood islands and five lighthouses, all designated in the "Historical and Cultural" category, and small enclaves on several islands set aside for "essential public use and development"—ranger stations, campgrounds, and other facilities. Over 90% of the park fell into the primitive or natural environment categories, and the newly zoned park became, for the purposes of management, a more legible one.[6]

The boundaries established for easier management took on added importance as NPS moved towards wilderness management in the Apostles. While NPS officials determined the wilderness status of the islands, they labeled most of the new park as a "potential wilderness." The lakeshore's second management document, published in 1977, placed 97% of the park within a "Wilderness Study Subzone." NPS policy required the agency to manage areas like this to preserve their wilderness character, and even to take active steps to restore wilderness. These requirements applied, in particular, to areas with long histories of human use. The 1975 edition of *National Park Service Management Policies* provided guidance for the administration of areas with evidence of logging, grazing, and farming: "Where such uses have impaired wilderness qualities, management will be directed toward restoration of wilderness character." Later versions of NPS *Management Policies* used more bureaucratic language, employing the term "non-conforming conditions" to refer to evidence of past human use: "The National Park Service will seek to remove from potential wilderness areas the temporary, non-conforming conditions that preclude wilderness designation." The goal of this policy was to protect areas that might be designated as wilderness from potential development, and also to provide management guidance during the decades-long process of wilderness designation. Removing non-conforming conditions also made the management categories cleaner and simpler to administer.[7]

As the NPS crafted these servicewide wilderness management policies, it did so in response to a national wilderness movement that was surging in popularity in the 1960s. The wilderness movement secured landmark victories with the protection of Echo Park in Dinosaur National Monument in the late 1950s and with the passage of the Wilderness Act in 1964. Hikers and campers were in the process of adapting the way that they used the wilderness, stressing a "leave no trace" ethic that emphasized the apparently pristine qualities of wild nature. Removing non-conforming conditions and segregating different uses of nature thus brought NPS policy in line with an emerging ideal that emphasized wilderness as a place without people and satisfied the needs of modern, bureaucratic management for legibility.[8]

The Park Service's construction of legible wilderness landscapes has had two significant consequences. One is an underappreciated tradition of wilderness restoration on lands managed by NPS. In all corners of the country, NPS management has brought the return of wilderness characteristics and the maintenance of healthy, vibrant environments.[9] But for rewilding landscapes—places where wilderness characteristics have returned in ways

informed by long periods of intensive use—this tradition has had an important and ironic consequence: the oft-held view that history intrudes on the ecological integrity and significance of places valued for their natural characteristics. NPS has a long record of removing cultural resources from natural areas in the name of nature protection, particularly in wilderness areas. Parks as widely dispersed as Shenandoah National Park in Virginia, Point Reyes National Seashore in California, and Sleeping Bear Dunes National Lakeshore in Michigan have all followed this course. In many cases, NPS officials have used wilderness status as a mandate to remove shelters, cabins, or other artifacts without regard for their significance as historic resources. Or, they have simply allowed historic resources to fall into such disrepair that they are removed as safety hazards. There are practical concerns as well, such as the cost involved in maintaining and stabilizing old and collapsing structures. But in managing for a wilderness ideal that excludes humans, NPS has removed evidence of human history from wilderness areas.[10]

Changing wilderness ideals and the bureaucratic language of non-conforming conditions might seem abstract. But as in other wild places around the country, these concepts had on-the-ground consequences for the Apostle Islands. When NPS assumed control of the Apostles, it inherited almost two hundred structures—net reels, ruined logging camps, summer cottages, and other remnants of more than a century of Euroamerican use. Under wilderness management, these structures became non-conforming conditions and many were razed by maintenance crews. One AINL official explained the policy toward old cabins and other structures: "[The] National Park Service will remove them and allow the natural vegetation to return.... The plans of Apostle Islands National Lakeshore are to maintain the area in a near natural state." Tearing down a fishing shack, planting native vegetation, and installing a rustic campsite enhanced the wilderness experience for visitors. Campers could stay on the islands, camp in clearings created by farmers and fishermen, but believe that they were exploring pristine nature.[11]

NPS policy thus creates what is in some ways an illusion—the appearance of untouched nature. This is what many visitors expect to find in the Apostles and in other wilderness areas, an expectation that is reinforced both by the dominant wilderness ideal and also by NPS management. The segregation of natural and cultural landscapes obscures the human stories buried in the wilderness, making it much harder to see the connections between nature and culture that created so many wild places.[12]

NPS does protect and interpret history at AINL, and it does so well. The park's management of historic resources, however, reinforces the segregation of nature and culture. The interpretation of history is confined to small, isolated enclaves—the lighthouses and two restored fish camps—designated specifically for the management of cultural resources. This segregation occurred immediately after the establishment of the park. The 1971 *Master Plan* classified these areas as "Historic and Cultural Zones," and this division has persisted. Historic sites that meet the criteria for listing on the National Register of Historic Places typically—although not necessarily—qualify for continued preservation within a wilderness area; those that do not are often classified as "non-conforming conditions" and targeted for removal. The park has ten sites on the national register, but only one lay within the potential

Figure 3. The trail from East Bay dock at Sand Island leads to the site of the Noring farm, once the most extensive agricultural landscape on the island. Rusting equipment lies in the fields. The well and a pile of moldering boards are all that remain of Noring home, although many of the plants that mark the home site can still be identified. Photograph courtesy of William Cronon.

wilderness area mapped out in 1977, and none fall within today's designated wilderness area. NPS managers zoned the park for simpler management, strictly dividing the park's historic and natural resources.[13]

The idea of legibility is a useful tool in understanding how and why the NPS has managed the Apostle Islands and other places. But the bureaucratic demand for simplified landscapes has limited the Park Service's ability to manage for and interpret the complex environmental histories of places like the Apostles, and it has often led to a set of policies that have obscured the histories of these places.

Staff at AINL now face the challenge of managing the park's rewilding landscapes. Park planners have incorporated the concept of rewilding into the latest version of the lakeshore's general management plan, although what this means on the ground has yet to be determined. It will certainly entail building on NPS's strong tradition of protecting and restoring wilderness characteristics, but also deciding how to preserve buildings, stabilize ruins, and protect ecosystems in a way that evokes for visitors the complicated interactions between nature and history that have created these places. It means figuring out where to put signs and interpretive exhibits—and where not to. But most importantly, it means celebrating the Apostle Islands as a storied wilderness. If NPS management demands categorization, then perhaps AINL planners will pioneer a new category for the administration of such places, one that recognizes both natural and cultural history. A category that allows for shades of gray will be difficult to conceive, but might be necessary for a management regime that is historically

accurate, ecologically sound, and responsive to the richness and history of rewilding landscapes. Superintendent Bob Krumenaker sees the challenge as an opportunity: "I don't think, if we do it right … that wilderness has to entail either balancing nature and culture—which suggests one gains while the other loses—or sacrificing one at the expense of the other. We can preserve both nature and culture at the Apostle Islands and should embrace the chance to do so."[14]

NPS can best meet this challenge by creating legible landscapes—but landscapes that are legible to the visitor, not the manager. The segregation of nature and culture in park landscapes not only obscures the history of these landscapes, it also hides the most important lessons that rewilding places can teach. A wilderness legible to visitors would reveal the connections between nature and culture that created so many wild places, and open for visitors a new way of thinking about the relationship between humans and the natural world. NPS interpretative and management efforts can inform visitors about the rich histories of the islands, their vibrant environments, and the ways that these two seemingly distinct categories overlap. Visitors would enter the wilderness armed with the ability to see its history, and emerge from it more able to recognize the consequences of human habitation in nature.

Visitors equipped with such information would not expect to find pristine wilderness, and they would be better able to understand the landscapes that they encounter. The forest clearing that once housed a Sand Island farm would no longer appear to be a field of wildflowers or pristine wild nature, but rather a rich historical landscape *and* a wilderness. The commercial fishing nets that still float in the channels between the islands would no longer be a commercial and extractive intrusion into the purity of the wilderness, but instead a clue about past and ongoing interactions with nature. The revegetation of disturbed landscapes in the wilderness would no longer seem like a paradox of management, but rather evidence of the continuing human role in the rewilding of the islands and the necessity of intervention to protect the places we value most. Parks like the Apostle Islands would become a place for reading the long history of human–natural interactions and the consequences of human choices.

Many other places teach the same lessons, especially areas east of the Mississippi River, places where

Figure 4. NPS has removed many buildings and other structures from the islands to foster their appearance as a wilderness. Many, however, remain, including this outhouse on Otter Island. There is no information to indicate the history of sites like this; visitors discover it for themselves. Photograph by the author.

wildness has returned after long periods of human use.[15] But stories of nature and history inhabiting the same landscapes emerge in the West, too, as they do in the Phillip Burton Wilderness, located 40 miles north of San Francisco at Point Reyes National Seashore. Congress created the park in 1962, and it designated over 25,000 acres of the park as wilderness in 1976. The park is a favored destination for those seeking to escape the crowds and congestion of San Francisco. Visitors can hike over 140 miles of trails and explore "a serene and sternly beautiful expanse of rock-lined beaches and a forest of fir and pine broken by meadowlands…." As at AINL, this wilderness was created out of a historic landscape—those forests and meadowlands once housed dairy farms. Wilderness designation depended on an NPS policy of removing buildings, roads, and other structures, and even on minimizing knowledge and interpretation of the park's human history, to foster the appearance of pristine nature.[16]

Even at Grand Canyon National Park, one of the crown jewels of the national park system and one of the places most celebrated for its wilderness, historic and wild landscapes overlap. Over five 5,000,000 people visit the Grand Canyon each year, but the vast majority of them stay at the visitor complex on the South Rim. Few would consider this crowded area or the canyon's most popular trails a wilderness. Those in search of a wilderness experience choose the other trails like the Grandview, the South Bass, or the Tanner. Yet these trails have a history not readily apparent to today's hikers. Many of the trails carried Hopi and Havasupai Indians on trade routes; others were constructed by miners seeking a way to pack copper ore and asbestos out of mines located deep in the canyon. Hikers who follow the 3.2 steep and winding miles of the Grandview Trail to Horseshoe Mesa find the remains of the Last Chance mine—mining pits, ore cars, and other industrial machinery, surely an unexpected find in the middle of the Grand Canyon. On the Grandview and elsewhere, miners realized that it would be more lucrative to load their mules with tourists than ore. As in the Apostle Islands, wilderness at the Grand Canyon is layered with stories. So, too, are the designated wilderness areas at Yellowstone and Yosemite national parks, despite a popular understanding—and management plans—that obscure these histories.[17]

The need for landscapes legible to the visitor extends beyond wilderness management. A management focus on creating legible landscapes could also help visitors understand exotic species—both the threat that they pose and the history that they represent. Dangerous invasive species such as purple loosestrife and garlic mustard (both of which threaten the Apostle Islands, among many other parks) can wipe out local endemic species and endanger entire ecosystems. But many other exotic species, less dangerous and invasive ones, grow in the islands, as well. A 1993 survey found 160 exotic species, or 21% of all recorded plants. The areas of the park with the most extensive human history have the most exotics—threats they might at times be, but exotic species also testify to the histories that shaped many of today's wild places. Sheep sorel, orange hawkweed, Canada bluegrass, oxeye daisy, and white clover are the most common exotics. Most of these plants inhabit the cultural landscapes of the lighthouse clearings, cabins, and old farm fields. Only experts will recognize some of these plants as non-native. The periwinkles that line the trail to the Sand Island lighthouse—escapees from a long-ago garden—seem to most visitors like nothing more than pretty wildflowers.[18]

These plants do not threaten to disrupt native ecosystems—they are exotic species, but not invasive ones. They are likely never to be eradicated, even if NPS were to try. Like so much else in the rewilding islands, the periwinkles and clover challenge and complicate ideas about the relationship between wilderness and history. These exotic plants further demonstrate that the apparent dichotomy between these two categories is a false one. The settlers who brought these plants for their fields and gardens have long since left and their homes have disappeared, but the plants remain as a testament to their lasting impact on the land. Exotic plants and the history they represent do not necessarily compromise the wildness or the value of the islands. Spotted knapweed and garlic mustard threaten park ecosystems and demand aggressive control; periwinkle and clover do not. These plants tell stories, tales about past human choices and their long-term effects. Purple loosestrife reminds us of the consequences of the global interconnection of ecosystems and the need for proactive management. The periwinkles testify to a gentler past, a story of making a home in nature. Ignoring or removing these stories in search of pristine—and easily managed—wilderness means that we forgo the chance to learn from them.

Recognizing the consequences of past human action becomes more important as those consequences become more ubiquitous. NPS is struggling to respond to environmental changes occurring at a global scale that threaten the lands that it manages at a very local level. From the disappearing glaciers of Glacier National Park to the dropping water levels of Lake Superior, NPS officials find their management choices constrained by a changing climate. The way that NPS reacts and adapts to these challenges will be the subject of much discussion over the coming years. But the ways that the parks interpret these changing landscapes, the ways that they make climate change legible to visitors, could play a significant role in shaping public discussions and responses to climate change. One of the reasons that the issue of climate change is so hard to deal with is the fact that is so hard to see. Climate change seems esoteric and global, but people more readily respond to the concrete and the local. NPS could make a concerted effort to document and interpret the impacts of climate change in the parks, and also show local contributions to it. This would create a form of legibility, and it could help people understand how global changes in the climate are shaping and changing the very local places that we visit and most want to protect. It would also rely on the insights of environmental history.

Our desire to treat the parks as pristine places without human histories, and the managers' demand for simplified landscapes, make it difficult to address some of the most pressing issues facing NPS and other management agencies. Environmental history provides a tool that could make park management operations more legible, more transparent, and more instructive for visitors. Recognizing the environmental history of our parks will not compromise their value as wild places, or as wilderness. These places tell stories about past human choices and their consequences—stories about the destruction caused by logging and mining, but also tales of making a home and of protecting and restoring nature. In the Apostles and places like them, the actions of the fishermen, lumberjacks, and land managers of a century ago are imprinted on island landscapes, and will remain so deep into the future. As we come to recognize the long-term consequences of those actions, we can better predict the legacies that our own choices will leave and better protect the places that we cherish.

Endnotes

1. Harlan P. Kelsey, "Report on Apostle Islands National Park Project," January 20, 1931, National Archives, RG 79, Box 634, National Park Service, General Classified Files, 1907–1932, "Proposed National Parks," 0-32.
2. Apostle Islands National Lakeshore, *General Management Plan: Apostle Islands National Lakeshore, Wisconsin* (Denver: National Park Service, 1989). The area was originally designated as the Gaylord A. Nelson Apostle Islands Wilderness, but the name was changed in 2009.
3. James C. Scott, *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998), 2. Scott argues that the need for legibility derives from what he terms "high modernism": a fusion of scientific expertise, state authority, and nationalism that fueled modernization plans in highly autocratic governments in Russia, Brazil, Tanzania and elsewhere in the mid-20th century. Some of the same tendencies emerged in arguably gentler forms in the United States. The need for legibility did not emerge from the decisions of individual NPS managers, but rather from the functions of a modern and bureaucratic government using scientific expertise to achieve social and economic goals.
4. Ron Poff, *From Milk Can to Ecosystem Management: A Historical Perspective on Wisconsin's Fisheries Management Program, 1830s–1990s* (Madison: Bureau of Fisheries Management and Habitat Protection, Wisconsin Department of Natural Resources, 1996).
5. Richard West Sellars, *Preserving Nature in the National Parks: A History* (New Haven: Yale University Press, 1997), 192; National Park Service, *The National Parks: Shaping the System* (Washington, DC: US Department of the Interior, 2005), 88; John C. Miles, *Wilderness in National Parks: Playground or Preserve* (Seattle: University of Washington Press, 2009), 170; Lemuel A. Garrison, "Practical Experience in Standards, Policies, and Planning," in *First World Conference on National Parks*, ed. Alexander B. Adams (Washington, DC: Government Printing Office, 1962), 191, 193.
6. National Park Service, *Master Plan: Apostle Islands National Lakeshore, Wisconsin* (Washington, DC: US Department of the Interior, 1971), 25, 27.
7. *Management Policies, National Park Service* (Washington, DC: US Department of the Interior, 1975), VI-2; National Park Service, *National Park Service Management Policies* (Washington, DC: National Park Service, 2001), section 6.3.1; National Wilderness Steering Committee, "Guidance 'White Paper' Number 1: Cultural Resources and Wilderness," November 30, 2002, online at http://www.wilderness.net/NWPS/documents/NPS/NWSC_White_Paper_1_Cultural_Resources_final.doc.
8. Mark Harvey, *Wilderness Forever: Howard Zahniser and the Path to the Wilderness Act* (Seattle: University of Washington Press, 2005); James Morton Turner, "From Woodcraft to 'Leave No Trace': Wilderness, Consumerism, and Environmentalism in Twentieth-Century America," *Environmental History* 7 (July 2002): 462–484.
9. NPS is often perceived as being hostile to the Wilderness Act. Many scholars have noted the resistance to passage of the bill among NPS leaders, who resented the apparent infringement on the agency's autonomy in land management. See, for example, Sellars,

Preserving Nature in the National Parks and Miles, *Wilderness in National Parks*.

10. Stephanie S. Toothman, "Cultural Resource Management in Natural Areas of the National Park System," *Public Historian* 9 (Spring 1987), 69; Arnold R. Alanen and Robert Z. Melnick, "Introduction: Why Cultural Landscape Preservation?" in *Preserving Cultural Landscapes in America*, ed. Arnold R. Alanen and Robert Z. Melnick (Baltimore: Johns Hopkins University Press, 2000), 20; Laura A. Watt, "The Trouble with Preservation, or, Getting Back to the Wrong Term for Wilderness Protection: A Case Study at Point Reyes National Seashore," *The Yearbook of the Association of Pacific Coast Geographers* 64 (2002), 55–72; Melody Webb, "Cultural Landscapes in the National Park Service," *Public Historian* 9 (Spring 1987): 77–89; Rebecca Conard, "Applied Environmentalism, or Reconciliation Among 'the Bios' and 'the Culturals,' *Public Historian* 23 (Spring 2001): 9–18; special issue of *Cultural Resource Management*, "Shenandoah: Managing Cultural Resources in a Natural Park' (volume 21, no. 1, 1998).
11. Apostle Islands National Lakeshore annual reports for 1975, 1978, and 1979, available at AINL headquarters, Bayfield, WI; Warren E. Bielenberg to Janice Blades, February 25, 1974, AINL Reading Files, Bayfield, WI.
12. Since the 1990s, scholars from a wide variety of fields have critiqued the wilderness idea, arguing that it is a cultural construct rather than an accurate description of lands that somehow avoided the impact of human activity. These critiques have sparked equally cogent defenses of the wilderness idea. Multiple perspectives on this issue, often called the wilderness debates, are included in J. Baird Callicott and Michael P. Nelson, eds., *The Great New Wilderness Debate: An Expansive Collection of Writings Defining Wilderness from John Muir to Gary Snyder* (Athens: University of Georgia Press, 1998).
13. The National Historic Preservation Act of 1966 requires all federal agencies to document the properties under their control for eligibility on the National Register of Historic Places. Listed properties receive special management consideration. Before taking any action that might affect a listed property, NPS must follow a consultation process to determine appropriate mitigation options. Nothing prohibits the inclusion of listed properties within wilderness areas, and listed properties can still be torn down or altered—so long as the consultation process has been followed. One byproduct of the listing process is that only places and stories thought to be historically significant at the time of the review are listed, although understanding of what is significant can change with new information or new interpretation. The way that we value and understand both nature and history changes over time. David Louter, personal communication, September 10, 2009; James W. Feldman and Robert W. Mackreth, "Wasteland, Wonderland, or Workplace: Perceiving and Preserving the Apostle Islands," in *Protecting Our Diverse Heritage: The Role of Parks, Protected Areas, and Cultural Sites*, ed. David Harmon, Bruce M. Kilgore, and Gay E. Vietzke (Hancock, MI: George Wright Society, 2004), 271–275.
14. National Park Service, *Apostle Islands National Lakeshore: Draft General Management Plan Environmental Impact Statement* (Washington, DC: National Park Service, 2009); William Cronon, "The Riddle of the Apostle Islands," *Orion* (May/June 2003): 42.

15. Western wilderness areas, too, have human pasts, and the environments long regarded as "pristine wilderness" in places such as Yellowstone and Yosemite national parks were shaped and reshaped by Native American agricultural practices and use of fire. Many Western parks were spared the relatively more disruptive agricultural and extractive practices of Euroamerican settlement and incorporation into the market economy. See, for example, Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001) and Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999).
16. "Philip Burton Wilderness," Wilderness.net, accessed 4 August 2009, online at http://www.wilderness.net/index.cfm?fuse=NWPS&sec=wildView&WID=455; Watt, "The Trouble with Preservation."
17. Formal wilderness designation in the Grand Canyon has been held up by disputes over the management of motorized rafts on the Colorado River; 94% of the park is managed as potential wilderness. J. Donald Hughes, *In the House of Stone and Light: A Human History of the Grand Canyon* (Grand Canyon Natural History Association, 1978), 47, 54.
18. Emmet J. Judziewicz, "Survey of Non-native (Exotic) Vascular Plant Species of Campgrounds and Developed Areas, Apostle Islands National Lakeshore," unpublished report (2000), AINL Library, Bayfield, WI, 7–8, 40, 41.

James W. Feldman, Department of History, University of Wisconsin–Oshkosh, 800 Algoma Boulevard, Oshkosh, Wisconsin 54901-8671; feldmanj@uwosh.edu

The Changing Face of the Country: Environmental History and the Legacy of the Civil War at Stones River National Battlefield

Rebecca Conard

In 1927, Congress authorized the War Department to acquire a portion of the site near Murfreesboro, Tennessee, where the Battle of Stones River took place. This marked the culmination of nearly three decades of agitation for a park by war veterans, North and South. The authorizing legislation directed the War Department to "carefully study the available records and historical data with respect to the location and movement of all troops which engaged in the battle of Stones River [December 31, 1862–January 2, 1863] and the important events connected therewith, with a view of preserving and marking such field for historical and professional military study." A commission appointed to survey the battlefield area for a feasible site selected approximately 325 acres situated adjacent to the 20-acre Stones River National Cemetery, a logical choice because the enabling legislation provided for inclusion of the cemetery, established in 1865 as the final resting place for more than 6,000 Union soldiers, including US Colored Troops. In 1930, this law was amended to enable the War Department to construct roads and walkways and to landscape the grounds.[1]

Except for the national cemetery and three existing monuments, all of the land selected for park development was privately owned. Land condemnation and acquisition proceedings took place over a five-year period from 1929 through 1934. Park development, however, began in 1931. The first item of business was to remove all traces of human occupation that post-dated the war, in this case the central area of a sprawling, semi-rural African American community known variously as The Cedars or Cemetery. The first name designates a hamlet located in and around a grove of cedar trees; the second designates the larger African American settlement of which it was a part. Both names indicate the hamlet's proximity to the national cemetery.[2] A 1929 War Department inventory of property details the quality of the land and improvements thereon: 17 houses, three cabins, eight barns, one smokehouse, one chicken shed, 11 miscellaneous sheds, four wells, 730 fruit trees (identified as peach in some instances), 1,000 blackberry vines, 200 grape vines, two churches, and one store.[3] The two church buildings, the only structures known to have been relocated, were moved

The George Wright Forum, vol. 28, no. 2, pp. 161–181 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

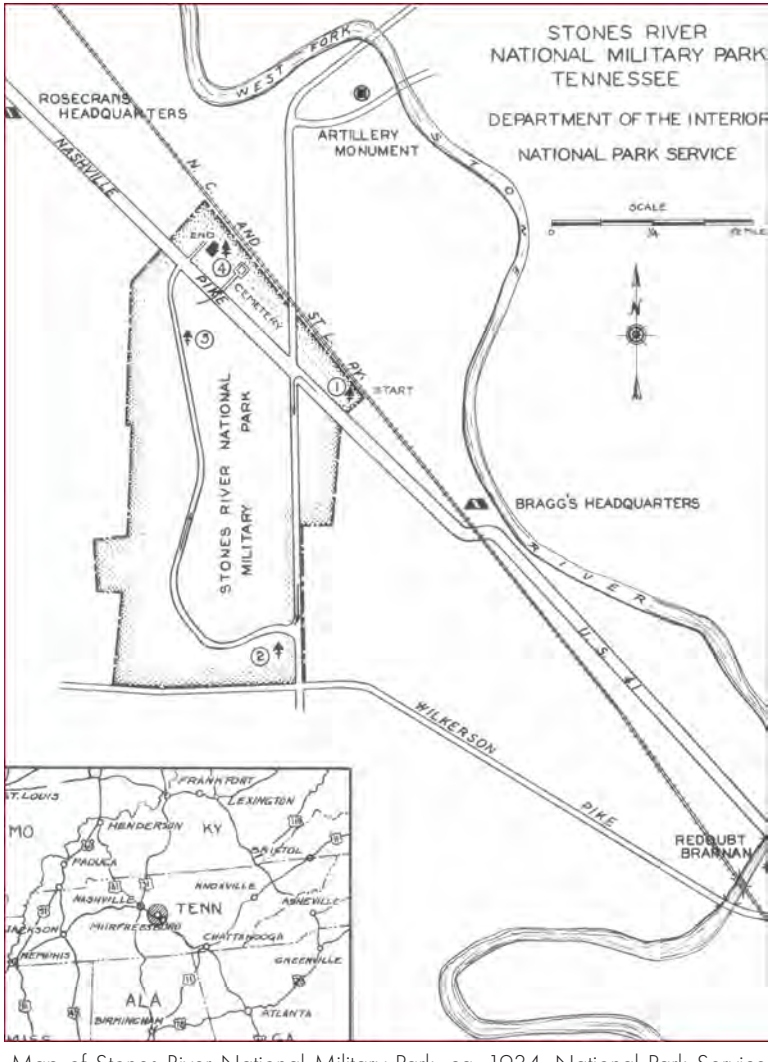


Figure 1. Map of Stones River National Military Park, ca. 1934, National Park Service. Courtesy Stones River National Battlefield. The auto tour road entrance, marked by a bent arrow, was then located at the intersection of Nashville Pike and Van Cleve Lane (unmarked). Tour stops, indicated by numbers, were (1) Hazen's Brigade Monument (1863), (2) the Slaughter Pen site, (3) probably the Defense of Nashville Pike site, (4) the US Regulars Monument (1888) at Stones River National Cemetery. Van Cleve Lane running north ends at the Artillery Monument (1906).

approximately one-half mile north, near a third church, a one-room school house, and the African American burial ground known as Evergreen Graveyard, situated near another grove of cedar trees. At least one more store, a combination general store and gas station, plus other farmsteads, dwellings, and outbuildings lay outside the area slated for parkland.[4] The actual number of people displaced in harder to calculate because several parcels were by then owned in estate by multiple heirs. Nonetheless, the inventory attests to the presence of a rural hamlet sustained in large part by agriculture, although most of the land on which the hamlet

sat contained limestone outcroppings of various densities, and fully one-third of the 325 acres was untillable.[5]

Although African Americans owned the greater number of parcels, which ranged in size from 1–17 acres, approximately half the total acreage was held by a handful of white landowners, some of them from locally prominent families.[6] Judging by a 1931 newspaper article, white residents of Murfreesboro approved of the park because it replaced what was considered a blighted area. An unnamed reporter was of the opinion that the "most marked improvement," involved removal of "the score or more negro cabins and an old church which clustered along the winding Van Cleave [sic] lane."[7] George Chandler, however, the army officer responsible for compiling the 1929 property inventory, was troubled by the land acquisition process:

> As I check and recheck the recapitulation I cannot help but wonder what sort of an idea it all conveys to anyone who has not been on the ground and lived in the community.... The negro holdings are a strange problem. The houses are in general worthless, and yet, they are the family's home and we are displacing the family which must find a new home some place.[8]

Indeed, it had been home to some families for two or three generations, and not all of them relocated willingly. Percy Minter, born in one of those houses in 1914, grew up on an 11-acre tract that had enough arable land for the family to grow cotton. After his father died in 1922, Percy and some of his six siblings worked the land along with their mother until the federal government took their property. The Minters held out until 1932, when they finally sold the property under court order.[9] Minter recalls that a trusted friend of the family told his mother:

> 'Rowena, don't go nowhere.' He say, 'we goin' to get you more money.' We had eleven acres. This white fellow ... he had two acres there. They gave him more for them two acres than they wanted to give my mother for them eleven acres. We stayed there [until] 1932.[10]

Between October 1931, when land clearance began, and July 1932, when the park was dedicated, the site of Cemetery Community was transformed. Where there had been houses, outbuildings, fruit orchards, and two churches clustered along Van Cleve Lane, together with gardens, stone and wood rail fences, and cultivated fields, the War Department attempted to recreate a battlefield landscape, albeit with a modern road to make that landscape accessible to automobile tourists. Stone masonry columns topped with pyramids of ten-inch cannon balls flanked a park entrance where Van Cleve Lane intersected Nashville Highway (now paved and also known as the Dixie Highway), and 2,500 new trees, shrubs, and other plants lined the park road. Cast-metal historical markers interpreted battle actions, and wire fencing marked the park perimeter.[11]

At the time, the practice of removing all traces of material culture not associated with the slice of history being preserved was the reigning principle of historic preservation in general and national park development more specifically: to preserve a *moment* rather than a *continuum* of time. After military parks were transferred from the War Department to the

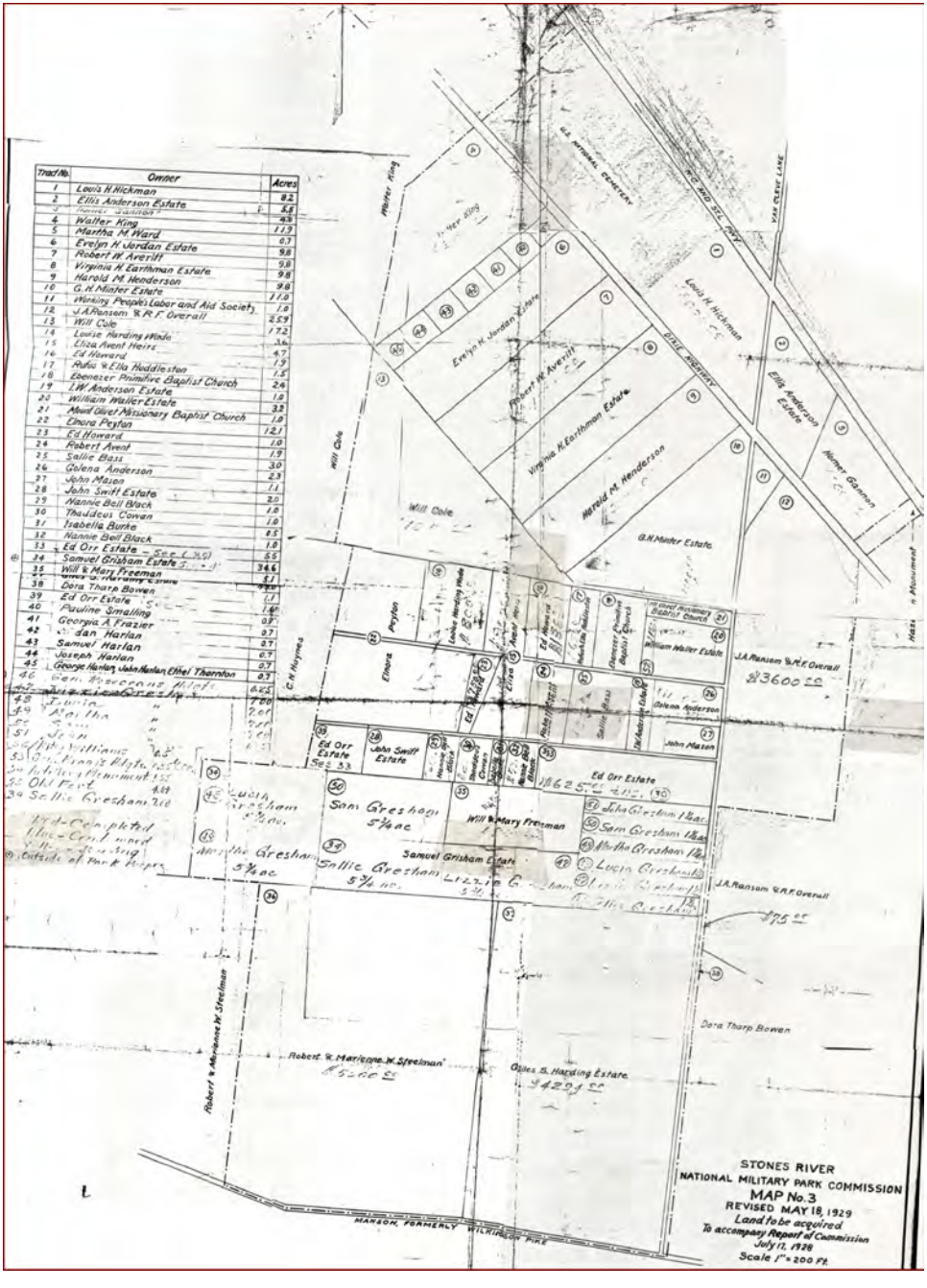


Figure 2. Land acquisition map for Stones River National Military Park, US War Department, 1929. The smaller parcels in the center contained most of the buildings in The Cedars. Courtesy Stones River National Battlefield.

Figure 3. Stones River National Military Park Commission photograph, 1928. Courtesy Stones River National Battlefield. The caption with this photograph indicates that the building visible in the left background is a church. With this identification as a firm clue, the vantage point of the photographer would have been facing southwest from the intersection of Nashville Highway and Van Cleve Lane. Thus, it is likely that the house and outbuildings on the right were situated on the Minter property, a triangular parcel bounded by both roads.

Figure 4. South entrance to Stones River National Military Park at Van Cleve Lane from the Nashville Highway. The view in the distance is where The Cedars was located.

Department of Interior in 1933 by executive order of President Franklin D. Roosevelt, the National Park Service continued to improve Stones River. With assistance through two New Deal relief agencies, the Civil Works Administration and the Public Works Administration, the NPS supervised work crews that cleared rock piles, broke up the remaining fence rows, and disposed of "rubbish" associated with land use by the residents of Cemetery Community.[12] NPS landscape architects introduced landscaping techniques such as screen plantings and trimmed grassy areas so the park "could readily be used as a recreational area to

serve the people of Murfreesboro." Because the size of the park, less than one-tenth of the battlefield area, made it impossible to interpret the full extent of military actions where they had occurred, NPS Chief Historian Verne Chatelain recommended developing a recreational area with tables, benches, fireplaces or grills, segregated comfort stations, running water, and a museum "to serve as a focus for the educational work at the park."[13] However, funding was never available to implement these recreational and interpretive elements. Wayside markers provided some geographic context, and the park offered ranger-led tours for those who wanted more information. Until 1956, Chickamauga–Chattanooga National Military Park administered Stones River, and the only on-site manager was the superintendent of the national cemetery. With the exception of periodic road improvements and construction of utility buildings, the park remained minimally developed until the 1960s.[14]

The National Park Service has considered "landscape" fundamental to interpretation at battlefield parks ever since they were transferred from the War Department in 1933. Verne Chatelain, the first chief historian, articulated a concept of site-based interpretation that was to become ubiquitous in historical parks. As Chatelain recalled in a 1961 interview with Charles Hosmer, he "found very little evidence of any kind of program which served as an example or a precedent for what we wanted to do" when he joined the NPS in 1931. He went on to explain that, "for many years the War Department had been entrusted with the national battlefield sites … but the opportunity to get a reasonably credible, accurate story with all the devices that would make for a clear understanding of what happened there was simply lacking."[15] The way to a clear understanding at a battlefield site, in the thinking of the 1930s, was to mark the landscape with interpretive signage, including maps, so that visitors could envision the dramatic event as it unfolded.

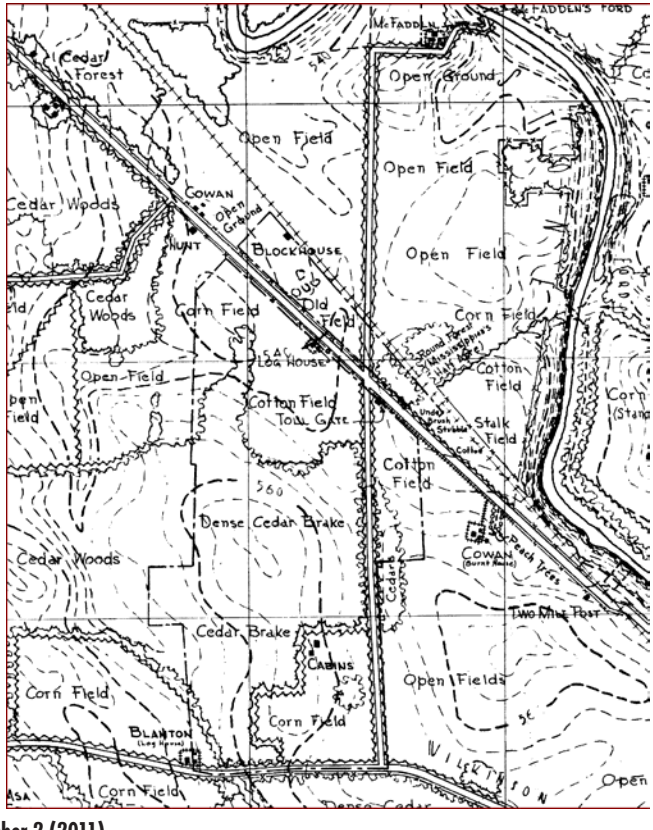
In this sense, Chatelain saw landscape as a stage, whereas one of his contemporaries, geographer Carl O. Sauer, had just introduced the concept of "cultural landscapes" as a complex geography "derived in each case from the natural landscape, [with] man expressing his place in nature as a distinct agent of modification."[16] Sauer's historical-anthropological approach to geography had no apparent influence on Chatelain, and actually, little influence outside the confines of cultural geography in the United States until J.B. Jackson founded *Landscape Magazine* in 1951. Through its pages, Sauer's thinking began to reach a wider audience.[17] Over the past three decades, however, cultural geography has transformed into an interdisciplinary field of landscape studies, which has greatly influenced the evaluation and management of cultural resources in the National Park Service.[18] Yet this influence has not extended very far when it comes to telling the stories inherent in our national parks. Civil War battlefields, which typically have extensive land areas, may be ideally suited for using cultural landscape approaches to interpret the significance of the Civil War more fully: in addition to the terrain of battle, the landscape is just as useful for interpreting the slave-based plantation economy overturned by the Civil War and the land-based communities of freed people who struggled for purchase in a new agricultural regime.

Fast forward to the decade-long NPS capital improvement program known as Mission 66, which ran from 1956 to 1966. Stones River National Battlefield was among the many parks developed or redeveloped during this period. To lay the groundwork for park development and new interpretive programs, Chief Historian Edwin Bearss conducted extensive

research to map the fields, fence lines, and structures present during the battle. Among many interesting features, the Bearss map depicts a dense cedar brake and cedar woods covering much of the land selected for the park.[19] During the war, this particular area became known as the "Slaughter Pen" for the intense fighting that took place here. On December 31, 1862, Union forces took up defensive positions amid large limestone outcroppings and cedar trees. Under this cover, Union soldiers stalled a Confederate assault, but the terrain hampered communication and coordination, and casualties were high for both sides. Gradually, Confederate troops weakened the Union position; and when Union soldiers tried to retreat, the trees and limestone boulders that initially had provided cover now hampered their movement. Essentially, the boulders and trees became a snare as men moved in retreat. Although the Battle of Stones River would yield a Union victory, the cost was nearly 24,000 casualties, and heavy loss of life took place in the Slaughter Pen. Today, this area is a key interpretive site.

The Bearss map, compiled for general management purposes, provided important information for natural resource management at the park. It also led to specific landscape interpretation efforts, notably broken cannon in the Slaughter Pen area and an interpretive

Figure 5. Detail of Historical Fence and Ground Cover Map, Stones River National Battlefield, National Park Service, 1962. Note the "dense cedar brake" and "cedar woods" in the lower left quadrant. Courtesy Stones River National Battlefield.



cotton field near Nashville Highway where one existed at the time of the battle and where the Minters were still growing cotton when they gave up their 11-acre home place in 1932. The museum in the visitor center presented a more family-oriented interpretation of the war emphasizing the common experiences of (white) soldiers who fought on both sides rather than the complex military actions of battle. This interpretive approach, which became standard at Civil War battlefield parks, conveniently ignored the obvious link between past and present and continued a long-established pattern of reconciliation through commemoration that began in the late 19th century.[20] Ironically, dedication of the new visitor center in April 1964 took place in the midst of a raging congressional debate over pending civil rights legislation and in the midst of the Civil War centennial. Interpreting the human side of soldiers in blue and gray thus gave the appearance of modernity without entangling the National Park Service in the new civil war being fought at public schools, at lunch counters in public places, on public transportation, at polling places, and in the press.[21] In this respect, it continued the official policy of non-discrimination at national parks without acknowledging that African Americans were central to the Civil War story or considering the implications of black-middle-class participation in the post-World War II automobile tourism boom.[22]

As the Mission 66 build-out took place, American society was in the midst of transformative change. The National Park Service reacted in various ways. In the late 1960s, NPS Director George Hartzog and Secretary of the Interior Stewart Udall embarked on reshaping the system to include recreational areas, scenic rivers, and national trails. This was a continued response to increasing numbers of park visitors as well as new national-level concerns for the environment. Passage of the General Authorities Act in 1970 officially redefined the system to include parkways and recreational areas.[23] Dwight Rettie argues that the 1970 act also represented the first time that "Congress clearly recognized that the national park system is something more than the sum of its parts," that, in the whole, "it is a statement about our national patrimony."[24] As prodigiously documented by Michael Kammen, the national pride fostered by World War II intensified in the post-war years, then twisted in myriad ways to become an institutionalized and commercialized "heritage syndrome," which continues unabated and increasingly blurs the line between "history" and "heritage."[25] The National Park Service has not been entirely immune to this phenomenon, although NPS resource management protocols and an increasing emphasis on the educative function of national parks have been mitigating forces.[26]

As Rettie observes, 1970 marks the point where national patrimony superseded patriotism as an underlying rationale for developing the national park system. The concept of a representative national park system took hold under Udall's successor, Walter J. Hickel. During his short tenure as secretary of the interior (1969–1970), Hickel issued a memorandum directing the Park Service to "protect and exhibit the best examples" of America's landscapes and undersea environments as well as the "life communities that grow and dwell therein[,] and the important landmarks of our history." Hickel further directed the Park Service to remedy "serious gaps and inadequacies" in the system in order that Americans could "understand their heritage of history and the natural world."[27] In response, NPS developed the National Park System Plan (1972), which expanded the thematic framework developed under the 1935 Historic Sites Act and established an elaborate taxonomic matrix to

treat all major aspects of American history—as then perceived—and to represent the full range of natural resources."[28]

Since 1972, the national park system has grown to include an impressive, if not fully representative, array of historic places. Today, the system encompasses more than 390 park units, and nearly half of them are classified variously as historical parks, historic sites, national battlefields, and national memorials. In terms of acreage, historical units account for a mere fraction—less than 300,000 acres—of the more than 84,000,000 acres protected by the National Park Service.[29] But their value cannot be calculated in terms of acreage. As the nation's education policies have narrowed to privilege science and math and hardened around standards-based pedagogy, national parks increasingly have been seen as important places for interpreting the diversity and complexity of American history and culture. To facilitate the telling of more inclusive stories, the NPS framework for history was completely reconceptualized in the early 1990s, when the traditional periods and themes anchored in Euroamerican experience were replaced with "eight concepts that encompass the multi-faceted and interrelated nature of human experience."[30]

Although many of the new historical units established since 1972 represent a continuation of established patterns—presidential birthplaces and homes, forts, and sites associated with or commemorating wars—the majority speak to a broadened view of American history, thanks in large part to the modern "rights" movements, which moved the system closer to representing America's pluralistic character. Many relatively young parks reflect rising demand for recognition and respect among groups long marginalized in American society and American history.[31] Amplifying the concept of national parks as conservators of national patrimony, the National Park System Advisory Board, in its 2001 report *Rethinking the National Parks for the 21st Century,* called upon the agency to think of parks as places to tell America's history "faithfully, completely, and accurately" because "our nation's history is our civic glue."[32] In the past decade, the National Park Service has embraced civic engagement as one way to distance national parks from the heritage movement.[33]

To these policy shifts one must add the current initiative to reinterpret Civil War sites, which began in 1998 when several NPS professionals met in Nashville to discuss a range of issues at Civil War parks, including the need for interpretation based on modern historiography. Then in 2000, at the urging of US Representative Jesse Jackson, Jr., Congress directed the secretary of the interior to encourage NPS managers at Civil War sites to "recognize … the unique role that the institution of slavery played in causing the Civil War." This led to another forum of park superintendents and scholars, out of which came *Rally on the High Ground*, a guidebook of sorts for beginning the process of acknowledging slavery as the underlying cause of the Civil War and the consequences of the war for the nation as a whole.[34]

All of these policy directions have converged at Civil War historic sites to create a complex resource management situation. Stones River National Battlefield is thus not unique in this respect, but it is one place where park management pursues an integrated approach to natural and cultural resource management. More to the point, integrated resource management has created an opening to employ analytic approaches associated with environmental history, notably the interdisciplinary scholarship of cultural landscape studies, to address

both aspects of the park's resource management responsibilities. Since the 1930s, the park has expanded to more than 600 acres and now includes approximately 3,000 linear feet of earthen works associated with Fortress Rosecrans, a 200-acre enclosure where the Union Army decamped in 1863 to hold the Chattanooga and Nashville Railroad line, a major objective of the Battle of Stones River. The earthen works, subject to erosion and structural disruption from burrowing animals, trees, and woody plants, pose one set of challenging preservation problems. The park routinely partners with community organizations and professors at nearby Middle Tennessee State University to maintain a historically representative ecology throughout the park.

Additionally, the park now protects within its boundaries a 185-acre cedar glade (a type of barrens) that has been designated a state natural area. The protected glade includes the battle area known as the Slaughter Pen. So, too, it represents the untillable land described in the 1929 inventory of property acquired for the initial park. This is no historical coincidence. Available evidence suggests that Cemetery Community emerged in this area of the former battlefield for three primary reasons: the presence of a contraband camp near Fortress Rosecrans; the corresponding formation of US Colored Troops (USCT) from among the contraband who gathered at Fortress Rosecrans, many of whom mustered out of service at Nashville; and the presence of Stones River National Cemetery, established in 1865. Circumstantial evidence points to poor-quality land as a fourth reason.

The Civil War diary of Jabez Cox, a soldier with the 133rd Regiment of Indiana Volunteers, which was detailed to Fortress Rosecrans from June through August 1864, contains an entry suggesting that the large contraband camp near Fortress Rosecrans might have been located in the vicinity of what is now the national park.[35] Another entry notes that the US Army was hiring African American refugees "by the month" to tend "several hundred acres of government cotton in this vicinity," meaning land either abandoned by Confederate loyalists or confiscated by the occupying Union troops.[36] When the 133rd Regiment left Fortress Rosecrans to return to Indiana, Cox recorded a final entry describing the "face of the country" around Murfreesboro:

> The face of the country had changed a great deal since we went to Murfreesboro the corn and cotton was then small the corn is now ripe and the pods of cotton bursting. The country generally looks desolate [An] old cotton press and an occasional dwelling with a few cultivated fields was all the signs of civilization seen[37]

The next year, in 1865, the federal government established Stones River National Cemetery near the intersection of Van Cleve Lane and Nashville Highway. William Holland, a former slave and veteran of the 111th Regiment, US Colored Infantry, worked for many years at the national cemetery and eventually purchased land nearby.38 Holland's story was repeated as other USCT veterans took up farming or found work as laborers in the national cemetery and became part of the African American settlement taking shape in the surrounding countryside. The War Department hired African Americans to retrieve and re-bury bodies, build the graveled cemetery lanes and limestone perimeter wall, landscape the grounds,

and maintain the whole. The federal government also established a field office of the Freedmen's Bureau in Murfreesboro, which provided an additional measure of security for a time. The commander of federal forces supporting the Murfreesboro field office assumed that the military would be entirely responsible for protecting "this unfortunate class of people" since "truly they cannot be left to the tender mercies of their former masters, the majority of whom may be disposed to treat them with kindness, but many are vindictive and treat them with cruelty."[39] At war's end, federal officials grappled with the issue of where thousands of freed people in the city and surrounding area were to settle permanently. In the summer of 1865, officials were trying to locate "some good plantation to put Freedmen on" since most of the abandoned land had already been leased out.[40] In a society keen to regain its agrarian economy, tillable land was a valuable commodity, and white farmers had priority access to good cropland.[41]

As of 1870, approximately 16,500 African Americans were living in Rutherford County, nearly 50% of the population.[42] Although the scars of battle were still evident on the land, a contemporary account indicates that the approximately 4,000 acres on which the Battle of Stones River was fought were once again producing corn and cotton. "Timber is scarce in this region, but wherever any could be found, it bore the marks of battle," wrote a correspondent for the *Cincinnati Commercial Tribune* in 1869. "At present," he continued, "the largest portion of the battlefield of Stone [sic] River is in cultivation, and where the sanguinary conflict once raged are now to be found fields of corn and cotton." Interestingly, during his inspection of the former battlefield, the newspaper correspondent spoke only with African Americans, one of whom told him that the Ku Klux Klan had recently "acted awful bad right about here and drove more than a hundred colored people away from their crops."[43] This statement suggests that many African Americans were tending their own fields. Legal documents present a clearer picture. In 1870, slightly more than 1,500 African Americans were enumerated in Civil District 9 of Rutherford County, the boundaries of which included much of Cemetery Community. Adult males and older children typically worked as farm laborers, although as many as six men identified as "farmers" owned real property. By 1880, approximately 30 African Americans, including three women, owned land in District 9. Many of them owned only a few acres, but several had landholdings of between 25 and 100 acres, indicating an established agricultural settlement comprising primarily blacks, although many of them still tended land owned by whites.[44]

As the 1870 and 1880 censuses make clear, the majority of African Americans associated with Cemetery Community tilled the soil, either as farm owners, sharecroppers, or farm laborers. Land in or near the cedar brake and cedar woods, gradually parceled out and sold to African Americans, became the hamlet known as The Cedars.[45] Although the legal and informal means by which this transfer of land ownership took place is the subject of ongoing study, the size of the landholdings and their location, on marginally productive land, fit a pattern of rural segregation in the South.[46]

Cemetery Community was only one of several post-emancipation African American settlements to emerge in and around Murfreesboro, and one of thousands throughout the South. In the aggregate, all of them are important for understanding how the face of the country changed, particularly in the South, as freed people sought to exercise their rights

Figure 6. Detail of 1938 aerial photograph showing Stones River National Battlefield as the landscape appeared at that time. The severity of its karst topography is revealed and the remnants of property boundaries in The Cedars are clearly visible.

and privileges as new citizens in an environment of hostility and resentment. That broad story is especially poignant at Stones River National Battlefield. Here African Americans were able to concentrate land ownership and, in concert, establish the social institutions that not only nurtured community life but sustained it even after the heart of the community was removed. A series of photographs taken by Albert Kern between 1896 and 1904, during which time he traveled several times to the battlefield site, provide the best evidence of what the area looked like at the turn of the 20th century. Although few of Kern's photographs can be matched precisely with present-day locations, they nonetheless give us a feel for the land and people of Cemetery Community.

The cedar glade protected in Stones River National Battlefield has not changed much in 150 years, but our values have. Cedar glades, a distinctive natural feature of the Central Basin, are disappearing from Tennessee at an alarming rate because of urban development, which is particularly intense in the metropolitan Nashville area. Seventeen of the 29 plant species endemic to Tennessee are present in the park, which, since 2001, has been an important site for the recovery of two federally endangered species, Pyne's ground plum (*Astragalus bibullatus*) and Tennessee purple coneflower (*Echinacea tennesseensis*). In 2006, the park received a Governor's Environmental Stewardship Award for Excellence in Natural Heritage Conservation to recognize its native habitat restoration program. This award came shortly after the city of Murfreesboro completed construction of a four-lane parkway from Interstate Highway 24 to create a new, luxuriously landscaped "gateway." On one side of the parkway rises a sprawling medical complex; on the other, an upscale shopping mall and conference center. New construction has consumed several hundred acres of land adjacent to the park. In addition to closing off any opportunity for significant land acquisition to approximate the 4,000-acre battlefield area, a long-cherished dream of many park supporters, it is

Figure 7. Albert Kern photograph, Stones River Battlefield Collection, late 1890s. The image contains no identifying information about the names of the two men or the precise location on the former battlefield, but the terrain and vegetation are consistent with The Cedars. Kern, an attorney in Dayton, Ohio, photographed battlefield sites as part of the coordinated effort to establish Civil War military parks. Courtesy Montgomery County Historical Society, Dayton, Ohio.

clear that Stones River National Battlefield now sits as an island in the midst of urban development, which has disrupted habitats, generated more traffic and noise, and marred viewsheds.

The park has always faced the challenge of interpreting a big story in a limited space. Now this challenge is greater than ever: the story to be told is much more complex, and the space available has nearly reached its limit, both as congressionally authorized and practicably feasible. To help address this challenge, the park collaborates with many local organizations and various departments at Middle Tennessee State University, including the Public History Program, which has developed an umbrella project called "Stones River Battlefield Historic Landscape" to document and interpret the post-Civil War history of the battlefield area. This project is part of an ongoing effort by the park to expand the story of the three-day battle the park was established to commemorate. In the past several years, the park has installed a new permanent exhibit that addresses slavery and sectionalism. It also has added wayside exhibits and interpretive programs that address the roles of African Americans in building Fortress Rosecrans and their service in the USCT.

Rather than present multiple, competing views about the causes and legacy of the Civil War, the Stones River Battlefield Historic Landscape project aims to foreground "the face of the country" in order to situate tangled stories of a specific place in ways that help make an immensely complicated and important national story both intelligible and compelling on a human, local scale.[47] This means giving park users a kind of intellectual freedom as they roam a landscape permeated with a deep swath of human and natural history. It means interpreting the landscape forthrightly in ways that treat the ground beneath visitors' feet not only as a place hallowed by sacrifice but also as a place where Americans, black and white, began the long and difficult process of creating a new kind of nation. It asks visitors to imagine what "freedom" meant, literally, on this very ground. And the definition of "freedom" was most uncertain for the freed people who had to reknit families, make a new community, and figure out how to thrive in an unfriendly country.

Since 2007, graduate students have been gathering research data and developing interpretive products focused on the story of Cemetery Community. Dozens of graduate students have combed deeds; court records; manuscript census pages; poll and property tax records; genealogical data; records of the Bureau of Refugees, Freedmen, and Abandoned Lands; USCT registers; and other holdings in the park archives, local repositories, and the National Archives. Their findings have outlined the progression of black land ownership in the park's core area, where the spatial pattern of African American holdings coincides topographically with the poor soils of the cedar glade, and in the surrounding area outside the park, where arable land is more abundant. Historic photographs from the mid-1890s to the late 1920s provide visual clues concerning the natural features, agricultural fields, fences, roads, and structures as well as the people who lived here.[48] Oral history is helping to connect family stories with the land.[49] Recently, a team of graduate students distilled masses of data and held community focus sessions to create design concepts for a new wayside exhibit, which will be placed along Van Cleve Lane, commemorating the history of Cemetery Community.[50]

While the story of Cemetery Community is important to document and tell, the research palette for cultural landscape interpretation in the park is actually broader. Graduate stu-

dents have also worked closely with park staff to develop a four-part thematic framework for interpreting the changing landscape of the battlefield area from the Civil War to the present.[51] The first theme, "Wasteland," examines the battle-scarred and denuded landscape that was consecrated with the establishment of a national cemetery in 1865. The second focuses on Cemetery Community, which imposed a new community structure and new agricultural regime on battlefield land. "Commemoration" traces the long history of remembering the battle, beginning with the erection of Hazen's Brigade Monument in 1863 and the establishment of Stones River National Cemetery in 1865 through the park's Mission 66 redevelopment. The fourth, "Landscape Connections," introduces the more recent environmental imperatives that added ecological protection and restoration to the park's resource management responsibilities.

Within this framework, there are many interconnected stories that are linked in one way or another with the park's purpose, to preserve a battlefield, and its core story. Not only can these stories enrich the context for new generations to understand the meaning and legacy of the Civil War, they also link this special place to broader historical questions of scholarly concern. How, for instance, does the process of African American community-building in this location compare to various patterns throughout the South during Reconstruction? By what localized processes did owner-operator farming, sharecropping, and tenant farming replace the slave-labor system of agriculture, and what differences were manifest in localized agricultural practices? How is the racialized landscape of memory revealed in national parks?

Ecological restoration and resource sustainability are major contemporary concerns of the National Park Service, and a number of scholarly and professional organizations strongly support science- and scholarship-based management of all resources in parks and protected areas. Environmental history is just one node of scholarship among many disciplines that inform resource management. However, the lens of environmental history has a wide angle that enables us to capture the complexities of human interaction with the natural environment over time. How have people, through time, adapted to or altered the natural landscape, and with what consequences? How does the land itself help us understand human history? Asking these kinds of questions can expand and deepen public understanding of a park's significance as well as provide a historic perspective on contemporary resource management concerns.

For more than a century, Civil War battlefield parks effectively enabled Americans to ignore one of the most important chapters in American history. National parks of course have not been the only, or even primary, drivers of institutionalized ignorance in this respect, but we know that national parks are important public places for imparting knowledge. Considering that approximately 200,000 people visit Stones River National Battlefield each year, the story of The Cedars and the larger Cemetery Community of which it was part, have considerable potential for helping visitors to understand the legacy of the Civil War in a particular locale. How did the Civil War change the face of the country, here and elsewhere? The key to telling this story fairly, and repeatedly, lies in doing what the National Park Service does best: place-based interpretation.

Endnotes

1. An Act to Establish a National Military Park at the Battle Field of Stones River, Tennessee, March 3, 1927 (44 Stat. 1399); An Act to Amend Section 5 of the Act Entitled "An Act to Establish a National Military Park at the Battle Field of Stones River, Tennessee, approved March 3, 1927," approved April 15, 1930 (46 Stat. 167); Ann Wilson Willett, "A History of Stones River National Military Park" (MA thesis, Middle Tennessee State College, 1958), 62–71. See also Sean M. Styles, *Stones River National Battlefield Historic Resource Study* (Southeast Regional Office: National Park Service, 2004) and Miranda Fraley, "The Politics of Memory: Remembering the Civil War in Rutherford County, Tennessee" (PhD dissertation, Indiana University, 2004).
2. An earlier name of "Ebenezer" is recorded in conjunction with the short-lived Tennessee Manual Labor University, organized by African Americans and chartered by the state of Tennessee in 1866. The school was built near Stones River National Cemetery. Whether it had any association with Ebenezer Primitive Baptist Church, one of the two churches situated in The Cedars, is unknown; see Lydia Morehouse, "Settling In: Tracking the Formation of Cemetery Community through Legal Documents" (MA thesis, Middle Tennessee State University, 2011).
3. George Chandler, Officer in Charge, to Quartermaster General, memorandum re: "Purchase of Land QM 601.1 C-R," October 22, 1929, File 601, Miscellaneous, Stones River National Military Park, RG 79, Records of the War Department Relating to National Parks, National Archives, College Park, MD.
4. Visual information comes from the Albert Kern Collection of Civil War Negatives (1896–1904), Montgomery County Historical Society, Dayton, Ohio [copies at Stones River National Battlefield Archives] and the Stones River Commission Photographs (1928), Stones River National Battlefield Archives.
5. Chandler memorandum.
6. The presence of some buildings on parcels held by white landowners indicates that some black residents were sharecroppers or tenants. See Angela Smith, Richard White, and Kristen Baldwin Deathridge, "Land Ownership along Van Cleve Lane" (research report for HIST 6510/7510, Middle Tennessee State University, December 7, 2007).
7. "Stones River Park Becoming Beauty Spot of Mid-State," *Daily News Journal* [Murfreesboro, TN], October 1, 1931. Oral tradition holds that both church buildings were moved by wagon to their new locations, and a 1980 architectural survey confirms that two 19th-century church buildings were then extant on two adjacent parcels of land acquired for relocation. It is possible that the newspaper reporter was not aware of the second church because it would not have been visible from Nashville Highway.
8. Chandler memorandum.
9. Rowena Minter et al. to USA, Decree Deed, Rutherford County Register of Deeds, Book 78, 259–260, executed February 24, 1932 and recorded July 8, 1933.
10. Percy Minter, Sr., interview with Elena DiGrado and others, November 1, 2007, Albert Gore Research Center, Middle Tennessee State University. The 1929 War Department inventory and map shows that the white man in question owned six acres, not two, and the entire parcel was considered "tillable." Of the 11 acres owned by the Minters, seven

acres were classified as "tillable" and the other four acres "rough." Even so, the Minter property was valued lower than the six-acre parcel. The method by which the War Department acquired land left a legacy of bitterness that persists to this day.

11. Willett, 85–90.
12. "Stones River Lands, Buildings, Roads & Trails: Civil Works Administration," File No. 0-31-619, Part 1, Stones River National Military Park, National Park Service, Department of the Interior, December 22, 1933–January 30, 1934, Stones River National Battlefield Park Records.
13. "National Military Park, Stones River: Public Works," File No. 0-31-618, Part 1, Department of the Interior, National Park Service, Stones River National Park, February 2, 1934–December 24, 1935, Stones River National Battlefield Park Records.
14. Willett, 106–110.
15. Charles B. Hosmer, Jr., "Verne E. Chatelain and the Development of the Branch of History of the National Park Service," *The Public Historian* 16, no. 1 (Winter 1994): 32–34.
16. Carl Ortwin Sauer, "The Morphology of Landscape," in *Land and Life: A Selection from the Writings of Carl Ortwin Sauer*, ed. John Leighly (Berkeley: University of California Press, 1963), 333.
17. On Sauer's influence through Jackson and, in the UK, W.G. Hoskins, see D.W. Meinig, ed., *The Interpretation of Ordinary Landscapes* (New York: Oxford University Press, 1979).
18. See, for instance, Robert Z. Melnick, *Cultural Landscapes: Rural Historic Districts in the National Park System* (Washington, DC: National Park Service, 1984); Melody Webb, "Cultural Landscapes in the National Park Service, *The Public Historian* 9, no. 2 (Spring 1987): 77–89; and Charles A. Birnbaum, *Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes,* Preservation Brief no. 36 (Washington, DC: National Park Service, 1994).
19. Edwin C. Bearss, "Historical Fence and Ground Cover Map, Part of the Master Plan, Stones River National Battlefield," National Park Service, Division of Design and Construction, Eastern, 1962.
20. For a general treatment, see David Blight, *Race and Reunion: The Civil War in American Memory* (Cambridge, MA: Harvard University Press, 2001). For a focused treatment of commemoration associated with Stones River National Battlefield, see Fraley, "The Politics of Memory."
21. Michael Kammen was among the first to observe that one of the distinctive characteristics of collective memory in American culture is our "inclination to depoliticize the past in order to minimize memories (and causes) of conflict. This is how we healed the wounds of sectional animosity following this Civil War; and that is how we selectively remember only those aspects of heroes' lives that will render them acceptable to as many people as possible." See Kammen, *Mystic Chords of Memory: The Transformation of Tradition in American Culture* (New York: Vintage Books, 1993), 701.
22. Terence Young, "'A Contradiction in Democratic Government': W.J. Trent, Jr., and the Struggle to Desegregate National Park Campgrounds," *Environmental History* 14 (Oct-

ober 2009): 651–682; Gretchen Sullivan Sorin, *"Keep Going": African Americans on the Road in the Era of Jim Crow* (PhD Dissertation, State University of New York–Albany, 2009), 96–97, 144–146, 186.

23. General Authorities Act, 84 Stat. 825, August 18, 1970.
24. Dwight F. Rettie, *Our National Park System: Caring for America's Greatest Natural and Historic Treasures* (Urbana: University of Illinois Press, 1995), 14.
25. Kammen, *Mystic Chords of Memory*, Part IV.
26. Gilbert J. Backlund, "Patriotism on the Battlefield: The National Park Service and Mission 66 at Stones River" (Master's thesis, Middle Tennessee State University, 2005) analyzes the 1960s re-development of Stones River National Battlefield in the context of Cold War politics and rhetoric.
27. National Park Service, *The National Parks: Shaping the System* (Harpers Ferry, WV: National Park Service, Harpers Ferry Center, 2005; rev. ed. of Barry Mackintosh, *The National Parks*, Washington, DC: National Park Service, 1991), 66.
28. National Park Service, *The National Park System Plan, Part One: History* (Washington, DC: US Government Printing Office, 1972). Ronald Foresta criticized the 1972 plan for providing Congress with a tool that it used freely "to turn national parks, especially historical ones, into distributive goods"; see Foresta, *America's National Parks and Their Keepers* (Washington, DC: Resources for the Future, 1984), 272. Later assessments, however, have concluded that the plan was largely ignored by Congress, which never sanctioned it, as well as by NPS personnel because it was never subjected to external review; see Rettie, 16–17; Richard West Sellars, *Preserving Nature in the National Parks* (New Haven, CT: Yale University Press, 1997), 212. The role of Congress in relation to shaping the national park system over time remains understudied.
29. National Park Service, *The National Parks: Index 2009–2011* (Washington, DC: National Park Service, Office of Public Affairs and Harpers Ferry Center, 2009). The index, which lists 391 national park units, does not include affiliate sites or the 49 heritage areas authorized by Congress between 1984, when the program began, and the Omnibus Public Land Management Act of 2009, signed into law March 30, 2009. As of this writing, 394 is the number of national parks generally given.
30. *History in the National Park Service: Themes and Concepts*, a joint effort of the National Park Service, the Organization of American Historians, the American Historical Association, and the National Coordinating Committee for the Promotion of History, ca. 1993, available online at http://www.nps.gov/history/history/hisnps/NPSThinking/themes_concepts.htm.
31. Several parks interpret industrial and maritime history, including Lowell National Historical Park (NHP) (1978), San Francisco Maritime NHP (1988), Keweenaw NHP (1992), Dayton Aviation Heritage NHP (1992), and New Bedford Whaling NHP (1996). Nine new units are associated with African American history: Tuskegee Institute NHS (1974), Maggie L. Walker National Historic Site (NHS) (1978), Boston African American NHS (1980), Mary McLeod Bethune Council House NHS (1982, 1991), Brown v. Board of Education NHS (1992), Cane River Creole NHP (1994), Nicodemus NHS (1996). Little Rock Central High School NHS (1998), and Tuskegee

Airmen NHS (1998). Women's history is now interpreted at many parks, but several units are specifically associated with women's history. In addition to Maggie L. Walker and Mary McLeod Bethune Council House, they include Clara Barton NHS (1974), Eleanor Roosevelt NHS (1976), Women's Rights NHP (1980), and Rosie the Riveter/ World War II Home Front NHP (2000). Likewise, World War II is interpreted at many parks, but Manzanar NHS (1992) and Minidoka Internment National Monument (2001) tell the stories of Japanese-American citizens who were held in internment camps during the war.

32. National Park System Advisory Board, *Rethinking the National Parks for the 21st Century* (Washington, D.C.: National Park Service, 2001), 4.
33. See, for instance, Robin Winks, "Sites of Shame: Disgraceful Episodes from Our Past Should be Included in the Park System to Present a Complete Picture of Our History," *National Parks* (March/April 1994): 22–23; Rolf Diamant, "On the Banks of the Cane River: A Reflection on the Role of the National Park Service in Public Life and Civic Dialogue," *Journal of the Association of National Park Rangers* (Fall 2001); National Park Service, *The National Park Service and Civic Engagement: The Report of a Workshop Held December 6–8, 2001 in New York City* (Boston: National Park Service, Northeast Regional Office, 2002); Martin Blatt, "Introduction: The National Park Service and Civic Engagement," *The George Wright Forum* 19, no. 4 (2002) (special issue devoted to civic engagement at sites of conscience); and Ed Linenthal, "The National Park Service and Civic Engagement," *The Public Historian* 28, no. 1 (Winter 2006): 123–129 [reprinted in *The George Wright Forum* 25, no. 1 (2008): 7–11.
34. Robert K. Sutton, ed., *Rally on the High Ground: The National Park Service Symposium on the Civil War* (Fort Washington, PA: Eastern National, 2001) contains essays by some of the more influential scholars—Ira Berlin, David Blight, Edward Linenthal, James McPherson, James Oliver Horton, Drew Gilpin Faust, and Eric Foner—who have encouraged and worked with the National Park Service to develop broader, more inclusive interpretations at Civil War sites.
35. Jabez T. Cox, "Civil War Diary of Jabez T. Cox," *Indiana Magazine of History* 28, no. 1 (March 1932): 40–54. The entry, dated June 4, 1864, states: "About 5 oclock P.M. we left the fort [Fortress Rosecrans] and marched about neart 2 miles from the railroad bridge over stone River, to a fine grove northeast of the Town [Murfreesboro] near the contraband quarters."
36. Ibid. Cox's July 11, 1864, entry states: "we passed through two large fields of cotton it will soon be in bloom and the darkeys say there will be a fine crop it is all the property of uncle Sam the darkies are hired by the month there are several hundred acres of government cotton in this vicinity." On July 14, 1864, Cox wrote: "some of the 17th US Colored a portion of which is camped near our quarters passed through this evening they are all stout heartly looking soldiers".
37. Ibid., August 25, 1864.
38. Ray Barnett, Marie Bourassa, Katie Merzbacher, and Brad Mitchell, "Cemetery Community Research Project: Group Five Team Findings Report" (HIST 6510/7510, Middle Tennessee State University, 2007). See also Michael T. Gavin, "Rutherford County's

African American Soldiers During the Civil War: The 110th and 111th Regiments U.S.C.T." (TMs, Heritage Center Collection, Middle Tennessee State University, 2007). The park interprets Holland's life with a wayside exhibit—"Slave, Soldier, Citizen"—located near his grave.

39. H.P. Van Cleve, Brigadier General, US Forces, Murfreesboro, Tennessee, to Brigadier General W.D. Whipple, AAG, letter, June 21, 1865, Records of the Field Offices for the State of Tennessee, Bureau of Refugees, Freedmen, and Abandoned Lands, 1865–1872, National Archives and Records Administration, RG 105, Series T142, Roll 27.
40. E.P. Hotchkip, Treasury Department, Murfreesboro, Tennessee, to Major General Johnson, July 17, 1865, Records of the Field Offices for the State of Tennessee, Bureau of Refugees, Freedmen, and Abandoned Lands, 1865–1872, National Archives and Records Administration, RG 105, Series T142, Roll 26.
41. Stephen V. Ash, *Middle Tennessee Society Transformed, 1860–1870: War and Peace in the Upper South* (Baton Rouge: Louisiana State University Press, 1988), 185.
42. Janet Hudson Goodrum, "Profile of Black Landownership in Rutherford County during Reconstruction" (Honor's Thesis, Middle Tennessee State University, 1989), 5–14, calculates that there were 2,800 African American heads of household in 1870, of which 140 owned real property.
43. Avery [single name only], "The Battlefield of Stone River," *Cincinnati Commercial Tribune* 30, no. 27 (September 27, 1869). This information accords with a report by Freedmen's Bureau agent J.K. Nelson, filed June 1868, in which he reported that, "The Klan in Rutherford County now numbers about 800 or 1000, has three or four lodges, and … has the sympathy and encouragement of nearly all the white people." Nelson, Monthly Report of Freedmen's Affairs in the Nashville Sub Districts for the Month of June, 1868, Records of the Field Offices for the State of Tennessee, Bureau of Refugees, Freedmen, and Abandoned Lands, National Archives and Records Administration, RG105, Series T142, Roll 41.
44. Census data of 1870 and 1880 and Rutherford County property tax records of 1877–1880, compiled by Lydia Morehouse; see Morehouse, "Settling In: Tracking the Formation of Cemetery Community through Legal Documents" (Draft MA thesis, Middle Tennessee State University, 2011).
45. Research completed to date suggests that one or two white landowners/speculators were the primary actors in these real estate transactions.
46. Rural segregation has been variously documented in relation to spatial settlement patterns, economic activity, and community formation. See Peter C. Smith and Karl B. Raitz, "Negro Hamlets and Agricultural Estates in Kentucky's Inner Bluegrass," *Geographical Review* 64 no. 2 (April 1974): 217–234; John Kellogg, "The Formation of Black Residential Areas in Lexington, Kentucky, 1865-1887," *Journal of Southern History* 48, no. 1 (February 1982): 21–52; Jill-Karen Yakubik, "Settlement and Occupation of the Chalmette Property," in Jerome A. Greene, *Historic Resource Study: Chalmette Unit, Jean Lafitte National Historical Park and Preserve* (New Orleans: National Park Service, September 1985); Steve Lerner, *Diamond: A Struggle for Environmental Justice in Louisiana's Chemical Corridor* (Cambridge, MA: MIT Press, 2005). Recent

scholarship on post-emancipation community formation in rural areas of the South includes Dylan C. Penningroth, *The Claims of Kinfolk: African American Property and Community in the South* (Chapel Hill: University of North Carolina Press, 2003); Susan Eva O'Donovan, *Becoming Free in the Cotton South* (Harvard University Press, 2007); and Allison Dorsey, "'The great cry of our people is land!' Black Settlement and Community Development on Ossabaw Island, Georgia, 1865–1900," in *African American Life in the Georgia Lowcountry: The Atlantic World and the Gullah Geechee*, Philip Morgan, ed. (Athens and London: University of Georgia Press, 2010).

47. *Rally on the High Ground* led to *The Civil War Remembered: Official National Park Service Handbook*, John Latcher and Robert K. Sutton, eds. (Fort Washington, PA: Eastern National for the National Park Service, 2011). Additionally, in fall 2010 the NPS Southeast Region adopted a strategic plan for commemorating the 150th anniversary of the Civil War by interpreting "serious messages, including slavery" at the more than 20 Civil War-related sites in the Region; see *150 Years: A Nation Divided, A Nation Reunited; and the First Steps on the Path to Full Citizenship for All Americans* (Atlanta: NPS Southeast Region, Fall 2010).
48. Some research data have been made publicly available online through Walker Library, Middle Tennessee State University; see Stones River Battlefield Historic Landscape Collection, http://library.mtsu.edu/digitalprojects/stonesriver.php.
49. A limited oral history project undertaken in 2007 was expanded in 2011 in collaboration with local residents who have familial ties to Cemetery Community or an interest in local African American history.
50. Mona Brittingham, Meghan Fall, Zada Law, and John Lynch, *Design Concepts for Historic Cemetery Community Wayside Exhibit, Stones River National Battlefield* (Murfreesboro: Middle Tennessee State University, Public History Program, May 2011).
51. Middle Tennessee State University Public History Program, *Listening to a Landscape: The Stories of Stones River National Battlefield*, portable exhibit developed by Elizabeth Goetsch with Elena DiGrado, Carolyn Powell, and Angela Smith in collaboration with Stones River National Battlefield, 2009. See also Elizabeth Goetsch, "'All Could Not Help But Feel It': Cultural Landscapes as Public History at Stones River National Battlefield," MA thesis, Middle Tennessee State University, 2011.

Rebecca Conard, Department of History, Middle Tennessee State University, Box 23, Murfreesboro, Tennessee 37132; rconard@mtsu.edu

Isle Royale National Park: Balancing Human and Natural History in a Maritime Park

Philip V. Scarpino

Introduction

Between fall 2006 and summer 2010, the author researched and wrote a historic context for the National Park Service intended to provide a framework for assessing the significance of surviving cultural resources on Isle Royale National Park, located in the northwest corner of Lake Superior (Figure 1).[1] Isle Royale, like many other units in the National Park Service's inventory, experienced considerable and extended human impact before becoming a national park. At the same time, Isle Royale's public story emerged as a single-theme, wilderness narrative. That narrative supported a management plan that stripped away much of the island's material culture in favor of re-establishing an "actual" wilderness that had not existed for a long time. Assessing the significance of cultural resources on Isle Royale turned on the historical meaning of that place, especially issues of wildness and wilderness contrasted with the long history of human use and development.

Even though moose and wolves are "exotic species" on Isle Royale, they have emerged as iconic symbols of wilderness, playing important roles in defining the modern meaning of that place. Moose experienced sudden introduction in about 1912; rapid population growth; catastrophic crash; and an uneasy equilibrium with the island even after wolves arrived in the late 1940s. The history of moose on Isle Royale raises several key questions: What is "natural" on Isle Royale? Historically what has constituted ecological integrity? Where are the lines between wild and not wild; between natural and not natural? How do the answers to these questions relate to defining, restoring, protecting, and preserving ecological integrity on the island? How can the answers to those questions enhance understanding of the interplay between natural and human history on Isle Royale?

On August 11,1998, *The Detroit News* published an article titled "The Campaign to Preserve Isle Royale," which summarized the founding of Isle Royale National Park and the piv-

The George Wright Forum, vol. 28, no. 2, pp. 182–198 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

Figure 1. Location of Isle Royale National Park.

otal role played by Albert Stoll, a conservation columnist for the *News*, in the establishment of the park.[2] Stoll was one of the key players in creating both the public constituency and the political will that resulted in Congress passing legislation early in 1931 that designated Isle Royale as a national park. The Crampton–Vandenberg Act authorized the secretary of the interior to develop a new national park. Issues related to private land claims proved thorny, and the legacy of the ways in which the National Park Service settled and administered those claims remains a major challenge associated with managing Isle Royale in the present. By April 3, 1940, the National Park Service had acquired a sufficient amount of private land and officially declared establishment of Isle Royale as a national park. Given the crisis of World War II, dedication took place August 27, 1946.[3]

The author of the August 1998 article in *The Detroit News* led with a description of the island and a historical summary of the threats that prompted Stoll to become interested in saving Isle Royale:

> Isolated by miles of water, the islands remained virtually untouched in the 300 years since French explorer Etienne Anto [sic] Brule stumbled across them in the early seventeenth century.
>
> But by 1920, virtually all of Michigan's native white pine forests had been cut down, and copper and iron mines dotted much of the Upper Peninsula. The islands—particularly the 210-square-mile main island of Isle Royale—were attracting lumber and mining companies hungry for new resources to tap.[4]

These few lines draw together and repeat a common blend of fact and myth that surrounds the history of Isle Royale. It is absolutely true that the rapid and wasteful harvest of the pine forests of the Great Lakes states caught the attention of many Americans and helped persuade them that natural resources were not without limit and that active conservation and even government protection was necessary to save what was left. Likewise, copper and iron mines "dotted much of the Upper Peninsula."

During the first third of the 20th century actual or potential resource exploitation presented a threat to the qualities that recreationists, outdoor enthusiasts, and wilderness advocates prized about Isle Royale. In the 1920s, summer cabins, several hotels, and numerous fishing camps dotted coastal locations on Isle Royale, but most of the land on the island was owned by a variety of mining companies. In 1922, summer residents of Isle Royale found out that the Island Copper Company, the largest property holder on the island, planned to sell 65,000 acres to the Minnesota Forest Products Company, which intended to begin large-scale cutting of pulp wood on Isle Royale. Summer residents organized themselves into the Citizens Committee of Isle Royale to oppose such threats. The Citizens Committee dispatched a request that the island be designated a state game and timber reserve to John Baird, Director of the Michigan Conservation Department. Baird forwarded their petition to Albert Stoll, outdoor editor of the *Detroit News*. Stoll visited Isle Royale in September 1921 and talked to summer residents about the island's potential as a state park.[5] On August 24, 1923, the Citizen's Committee of Isle Royale unanimously adopted the following resolution:

> Resolved, That the members of the Citizens' Committee of Isle Royale, collectively and individually, make every effort to have Isle Royale controlled by the National Government as a 'forest preserve' and thus be maintained in the condition that nature has left it.[6]

Making common cause with Albert Stoll gained the Citizens Committee an influential advocate and spokesperson, but in the process the committee lost control of the movement to save "their" island from development and exploitation. They also lost control of the opportunity to define and shape the narrative about the meaning of Isle Royale. By 1923 Stoll was actively boosting Isle Royale as a national park, and working with Michigan Congressman Louis C. Crampton, chair of a House subcommittee that partially controlled the budget of the National Park Service. Crampton helped bring Stoll and his plan to the attention of Stephen Mather, first director of the National Park Service, who was already interested in expanding the national park system, especially in the eastern half of the United States. In 1924, Stoll organized a tour of Isle Royale that brought key people to the island, including Mather, Secretary of the Interior Hubert Work, and Sierra Club President Francis Farquhar. After his trip to Isle Royale, Director Mather became a believer, and he used his influence to proselytize among conservation groups, including the Izaak Walton League, to support the idea of a national park on Isle Royale.[7] Stoll and Mather, Work and Farquhar became important players not only in persuading Congress to authorize creation of Isle Royale National Park but also in defining the public story of Isle Royale as a single-theme narrative emphasizing wilderness.

The essence of Isle Royale is its maritime location, where water, land, and sky overlain by physical isolation have combined to create a uniqueness of place. Even in the early 21st century, Isle Royale is hard to reach, which means fewer visitors than other national parks or lakeshores on the Great Lakes. Travelers to Isle Royale must leave the relative safety of the mainland and cross miles of open water on Lake Superior. They reach not a single island but a series of parallel ridges and atolls rising high enough above the lake to support plant and animal life —but still intimately bound to Lake Superior. Indeed, much of the total acreage embraced by the park's boundaries is water. Close inshore, a treacherous admixture of deep water close by rock reefs and fluctuating lake levels challenges the skills of boaters. On the island, hikers leave behind the technological security blanket of modern life to wander in a place where wolves bring down moose, where cell phones do not work, and where, even under optimum conditions, emergency medical evacuation can be hours away. In many ways, the 19th-century Romantic term "sublime" captures the feel of Isle Royale—a combination of spectacular natural beauty layered with a tinge of risk and danger; a blend of peace and tranquility set against the knowledge that nature in that place is beyond human control.

While Isle Royale was certainly "isolated by miles of water," a significant chapter in the story of the island is one of extensive human modification. By the 1920s, as the movement to protect Isle Royale germinated and grew, the island itself was far from an undisturbed wilderness. There are places on Isle Royale that have seen on-again, off-again human occupation for thousands of years.[8] In the prehistoric period, Isle Royale was likely used by multiple groups of Native Americans. Early people mined copper, hunted, fished, and gathered on Isle Royale. They canoed back to the mainland with copper in the shape of rectangular bars, awls, beads, and hooks. Timothy Cochrane notes in *Minong: The Good Place* that these ancient peoples used Isle Royale frequently and "traveled throughout the Island, living in many locations that are campgrounds today."[9] Archaeological evidence indicates that Isle Royale may contain the most important identified concentration of prehistoric mining features in the basin of Lake Superior.[10] By the "dawn" of the historic period, the Ojibwe were the only Native Americans still using Isle Royale. Following arrival of Americans in increasing numbers, the high point of Ojibwe presence on Isle Royale came in 1850 during a brief commercial fishing boom, which ended with the Panic of 1857. Thereafter, the Ojibwe experienced declining association with Isle Royale, which ended in the early 20th century.[11]

Europeans and Americans sought to profit by extracting commodities from the island and its surrounding waters. Nineteenth-century copper miners came and went three times (1843–1855, 1873–1881, and 1889–1893), pushed by a growing demand for the metal in an industrializing nation. Each wave of copper mining produced considerable development, population growth, and environmental modification.[12] Commercial fishing, which the American Fur Company began on Isle Royale in 1837, waxed and waned until the late 19th century. Thereafter, fishing began a period of growth and sustained production that lasted into the 1950s, when the commercial fishery in the west end of Lake Superior succumbed to the invasion of lampreys.[13] Fishermen sold catches in expanding urban markets on the mainland, first salted in wooden barrels and then fresh-packed in ice for transport in refrigerated cars on steel rails that literally tied the nation together. Many of the fishermen were Scandinavian

immigrants who joined the great migration from Europe to the United States. By the late 1920s, as the movement to protect Isle Royale gathered momentum, around 75 families, representing over 200 people, were fishing commercially on Isle Royale.[14]

Significant timber removal took place coincident with copper mining on Isle Royale, and by the 20th century, lumbering shifted to the harvesting of pulp wood. A black and white photograph taken in 1936 near Siskiwit Bay on the south shore of Isle Royale illustrates the impact of harvesting timber for pulp. The hand-written label proclaims: "18,000 Cords Pulp Wood 1 Mile Long," and the picture shows row after row after row of stacked pulp logs. While it is not possible to verify either the 18,000 cords or the mile of logs, the visual impact of all of that pulp wood makes a strong statement.[15] The label, "18,000 Cords of Pulp Wood 1 Mile Long," offers a boast and a declaration of accomplishment; it stands in powerful counterpoint to the attitudes and goals of people seeking to preserve the Island.

Resorts and recreational cabins and camps began to appear on Isle Royale in the 1890s. During the first half of the 20th century, there were three clusters of "settlement" on Isle Royale: Rock Harbor/Tobin Harbor on the eastern end, Belle Isle–Amygdaloid Channel in the northeastern quadrant of the archipelago, and Washington Harbor on the far western end. Each of these three population centers included resorts, active fisheries, and the homes of summer residents, which actually and symbolically drew these trends together into a common history of Isle Royale.[16]

In his classic volume, *The Wolves of Isle Royale*, Rolf Peterson describes a long-term study of the teeth of moose and wolves designed in part to uncover the environmental parameters of their symbiotic existence on Isle Royale. Peterson's description of the findings as they relate to wolf teeth connect the biology of Isle Royale with two worldwide patterns of development: the burning of fossil fuels and the radioactive fallout associated with the aboveground testing of nuclear weapons prior to the Nuclear Test Ban Treaty approved by the United States and the Soviet Union in 1963. Peterson concluded:

> In the island's wilderness, which is as pristine as any in the continental United States, wolves have inadvertently recorded [in their teeth] the two largest atmospheric perturbations generated by modern humans—the radioactive fallout from thermonuclear weapons and the accelerating rise in CO^2 from the combustion of fossil fuels. For any thinking human, this should underscore the scale of the modern human enterprise, and should hint at the magnitude of the challenge of maintaining natural processes in our national parks.[17]

Peterson's observation drives home the fact that the idea of wilderness plays such a central role in Isle Royale's narrative that it has become almost synonymous with the meaning of that place. It would be difficult, if not impossible, to assess the significance of the cultural resources on Isle Royale or to plan for their preservation and continuing use without carefully defining the historical relationship between wildness and cultural resources on the island.

In the 1960s and 1970s, with the advent of Mission 66, the ecology-based environmental movement, and passage of the federal Wilderness Act (1964), the National Environmental

Policy Act (1969) and the Eastern Wilderness Act (1975), the mission and management of Isle Royale National Park continued to evolve. President Gerald Ford signed legislation designating nearly all of Isle Royale as wilderness on October 20, 1976. Public Law 94-567 provided wilderness protection to 131,000 acres, which, along with small additions in subsequent years placed, about 99% percent of the land area of Isle Royale under wilderness designation.[18] President Ford's signature represented a victory for environmentalists and wilderness advocates who had waged a decade-long struggle with the National Park Service over the location and extent of wilderness on the island. One of the leaders of the movement to require the Park Service to expand wilderness on Isle Royale was Doug Scott, who had visited the Island on a backpacking trip in 1966. Writing many years later, Scott remembered, "I, a kid from the Pacific Northwest, had been in forestry school in Ann Arbor, feeling sorry for myself for being so far from the Oregon Cascades. Yet, having trekked around the grand wilderness areas of Oregon and Washington, I was not prepared for the world-class wilderness environment I discovered on Isle Royale."[19]

Historical patterns of use, development, and management on Isle Royale argue strongly that the island is not presently a wilderness as defined by the Wilderness Act of 1964. Public Law 94-567 signed October 20, 1976, was an omnibus-type wilderness bill, which included Isle Royale. Section 6 states that "The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act." Public Law 88-577 (16 USC 1131–1136), passed by the 88th Congress, Second Session, September 3, 1964, defines wilderness in the following terms:

> (c) A wilderness … is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain … an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable….[20]

Isle Royale clearly possesses wild qualities, although the wildest area in the vicinity of Isle Royale may be the surrounding waters of Lake Superior, with cold depths, shallow reefs, and formidable rocky coasts—beautiful, unpredictable, treacherous, and potentially deadly. Wilderness designation on Isle Royale is more a matter of managing land and resources to create a wilderness than protecting and preserving a place "where the earth and its community of life are untrammeled by man"; where land retains "its primeval character and influence, without permanent improvements or human habitation," and, a place "affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable." In the decades since the dedication of Isle Royale National Park in 1946, managers put considerable effort into creating wilderness, often by "erasing" cultural resources or allowing them to fall into ruin and disappear. The practice and policy of "erasure" and "moldering ruins" resulted in significant reduction in the stock of cultural resources in the Park. More recently, Isle Royale National Park stepped away from erasure and moldering ruins, and in the process raised an essential management question: What happens to cultural resources after the Park Service spares them from erasure?[21]

Managing Isle Royale as an "actual" wilderness not only denies or greatly diminishes the long and essential role of human history on the Island, but it also severs the intimate links between Lake Superior and Isle Royale, between water and land in shaping the meaning of that place over time. Isle Royale is much more than a remote bit of land set aside for hiking and camping in the middle of Lake Superior. It is a maritime park. The navigation channels in and around Isle Royale represent a fundamental element in shaping and understanding human use of Isle Royale from the time of the ancients to the present. The same can be said of long-used canoe routes and portages.

Historian William Cronon uses the term "rewilding" to describe Apostle Islands National Lakeshore, which he calls "a superb example of a wilderness in which natural and human histories are intimately intermingled." Cronon adds that if visitors believe they are encountering pristine nature, they will come away not understanding either the complex human history that has helped create today's Apostles or the degree to which that human history has shaped the nature they encounter in those islands. "In a very deep sense," Cronon agues, "what they will experience is not the natural and human reality of these islands, but a cultural myth that obscures much of what they most need to understand about a wilderness that has long been a place of human dwelling." In a similar manner, separating human and natural history on Isle Royale and privileging the wilderness narrative creates a cultural myth that obscures the significance of both the wild areas and the surviving cultural resources.[22]

Reflecting on the relationship between the Ojibwe, history, and wilderness in *Minong: The Good Place*, Timothy Cochrane observes that with the establishment of Isle Royale National Park "officials did not understand the historical links between the North Shore Ojibwe and Isle Royale." Cochrane further notes that "Isle Royale only became attractive as a potential national park … after its economic attractiveness hit bottom, when it becomes plain that its copper deposits would not make anyone rich. It then becomes valuable for its insularity, beauty, wildlife, and for many, a faux wilderness with no human past."[23]

There is some irony in the fact that the two species most commonly associated with wilderness on Isle Royale are exotics: moose arrived on the island around 1912, and wolves followed in the middle of the 20th century. In the mid-1930s, William F. Shiras, field naturalist, wildlife photographer, and author, reported that when he first visited Isle Royale in 1886 he neither saw nor heard reports of moose on the island. He added that "moose are believed to have come first to this island in the early winter of 1912, over an ice bridge from the mainland from either Minnesota or Ontario." Shiras joined a lengthy list of writers who repeated and perpetuated the claim that moose made a one-time crossing on the ice. Others modified the migration story to credit the moose with swimming to Isle Royale. (The closest mainland would require swimming or walking about 17 or 18 miles from Ontario and more than 20 miles from Minnesota at the international border.) Shiras also noted that in 1912 the Michigan State Conservation Commission planted nine white-tailed deer on Isle Royale.[24] Caven Clark concludes in *Archaeological Survey*, that "the presence of moose prior to historic contact has not been demonstrated." Rolf Peterson has the last word: "Careful archeological work by the NPS has revealed much evidence over the past 4,000 years of Native Americans, caribou, and beaver on Isle Royale, but no indication that moose or wolves inhabited Isle Royale before 1900."[25]

Reports by direct observers in the first third of the 20th century demonstrate a two-decade cycle of rapid expansion and precipitous decline of the moose population on Isle Royale (Figure 2).

Moose found a new home on the island with an abundance of browse, little competition for food, and no predators, including human hunters. Shiras explained that "for years Isle Royale has been a State game preserve where all shooting is illegal." He reported a population explosion hitting a peak of over 2,000, followed by a dramatic crash as the collective appetite of the ballooning moose population exceeded the available supply of food.[26]

Adolph Murie estimated in "The Moose of Isle Royale" that by 1930 the moose population on Isle Royale had increased to more than 1,000—a number he immediately qualified by observing, "I think that a count would give a figure far above the estimated minimum. As a rule, wild populations are greatly underestimated, so it would not be surprising if the actual number of moose in 1930 proved to be two or three thousand."[27] Murie's field work in 1929 and 1930 revealed that serious overgrazing by the moose was already well advanced. He observed significant depletion of pond weeds and lilies, as well as several varieties of terrestrial vegetation favored by the moose. Murie explained:

> Ground hemlock (yew), an evergreen shrub … is another important source of food which has been practically exhausted. Adams, in 1905, and Cooper, in 1910, found it growing in profusion.… Today nothing remains of this spreading shrub except the dead branches and a few leaves near the roots.[28]

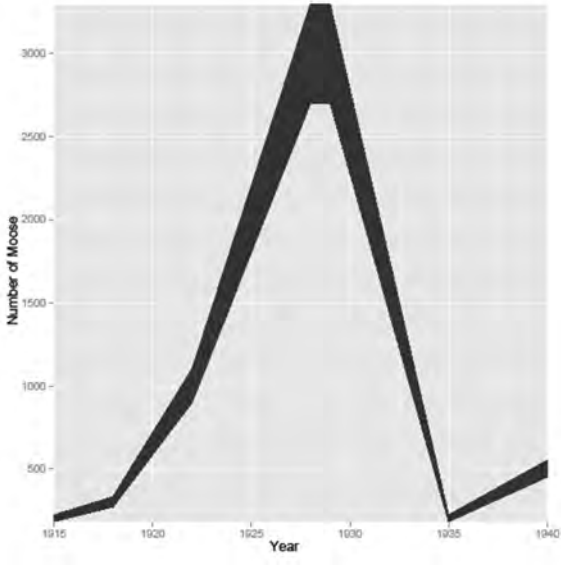


Figure 2. Crash of moose population, Isle Royale, 1915–1935. Figure prepared by Samuel V. Scarpino. Line width accounts for variability of population numbers reported. Scarpino based his calculations on figures and information on moose populations on Isle Royale from the following sources: Murie, "The Moose of Isle Royale"; Paul F. Hickie, "Isle Royale Moose Studies," *Proceedings of The North American Wildlife Conference Called by President Franklin D. Roosevelt* 11(1936): 396–398; John D. Snyder and Robert A. Janke, "Impact of Moose Browsing on Boreal-Type Forests of Isle Royale National Park," *American Midland Naturalist* 95, no.1 (1976): 79–92; B.E. McLaren and Rolf O. Peterson, "Wolves, Moose, and Tree Rings on Isle Royale," *Science* 266, no. 5190 (December 2, 1994): 1555–1558; François Messier, "Ungulate Population Models with Predation: A Case Study with the North American Moose," *Ecology* 75, no. 2 (1994): 478–488; Rolf O. Peterson, "Wolf–Moose Interaction on Isle Royale: The End of Natural Regulation?", *Ecological Applications* 9, no. 1 (1999): 10–16; Peterson, *The Wolves of Isle Royale.*

Murie concluded that the moose had exceeded the carrying capacity of their range and that their numbers diminished the pleasure people derived from seeing them in the wild. "For the greatest enjoyment of the moose," Murie wrote, "it is not particularly desirable to have them so plentiful that we involuntarily compare the gatherings of them to a prosperous barnyard." Murie offered a strongly worded conclusion: "Over browsing on the island is general. In order to preserve the landscape it is recommended that a drastic reduction of the moose population be made." Along with various forms of hunting, Murie suggested introducing large predators such as bears, mountain lions, or timber wolves. His explanation reveals insight into the multiple roles that wolves would eventually play on Isle Royale:

> Since one of these predators might possibly do good work in keeping the moose herd in check, and since there are few places where large carnivores are tolerated, it would seem desirable to introduce one or more of these predators on the island. Aside from the possible utility of the predator as a check on the moose population, such an introduction of a native species would add materially to the animal interests of the island.[29]

Rolf Peterson observed in 1999 that "following initial colonization early in the 1900s moose increased rapidly. The moose population grew to 3000 or more (5.5 moose/km^2) by the early 1930s, then starvation caused a sudden crash in 1934."[30]

The moose population continued to plummet. Another survey in the winter of 1931 estimated a population of 500, with evidence of heavy and destructive grazing by hungry moose. By 1934, "all the ground hemlock had been browsed to the roots" mountain ash trees were destroyed, the balsam "had been browsed beyond reach." Shiras wrote that "information received by the author from the Michigan Department of Conservation has disclosed that the unusually severe winter of 1933–34 and a heavy snowfall destroyed all the younger moose and that only about 75 adult animals survived."[31]

Until quite recently, the long-held and often-repeated assertion that moose reached Isle Royale in about 1912 either by crossing on the ice or swimming from Minnesota or Ontario received little scrutiny or critical analysis.[32] Journalists, historians, scientists, naturalists, and other writers accepted and repeated the moose "genesis story," apparently without asking: Does it make sense? Or, how many moose would have had to swim or cross the ice in 1912 to produce the population of thousands that crashed in the early 1930s?[33] Figure 3 offers preliminary population figures, which suggest that it would have taken between 25 and 60 moose arriving in 1912 to produce the estimated 3,000 moose that crowded the Island before the crash in the early 1930s. While the numbers reported in Figure 3 are not definitive, they do highlight a need for careful historic and scientific investigation.

The possibility that moose, like white-tailed deer, were deliberately introduced to Isle Royale deserves serious investigation, and at least impressionistically makes more sense than the assertion that a viable breeding population either made the long swim or crossed miles of ice in the dead of winter. It also seems likely that the caribou that predated moose on Isle Royale and the white-tailed deer transplanted in 1912 lost out to the moose in competition for food and disappeared from the island's environment.

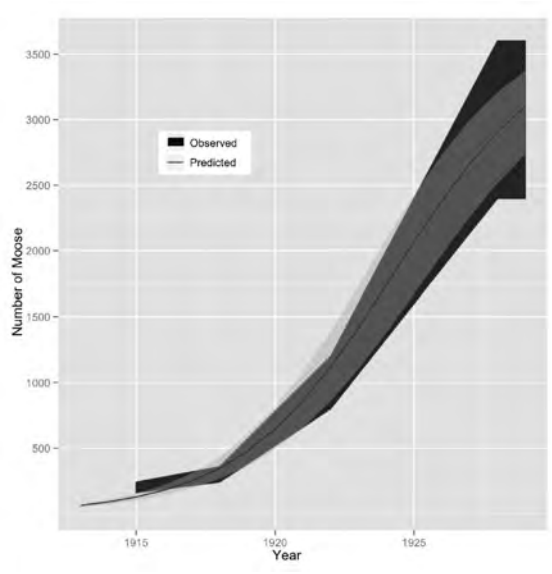


Figure 3. Moose population, Isle Royale, 1912–1930. Figure prepared by Samuel V. Scarpino, using the sources cited in Figure 2. Observed population (black) vs. predicted population (thin line) based upon best-fit growth model. Gray band represents 95% credible interval. Best-fit model suggests between 25 and 60 moose arrived in ca. 1912 and grew at an annual rate of 35% until ca. 1930, when the population overshot carrying capacity and crashed. For a detailed description of the methodology or to have technical questions answered, please contact Samuel V. Scarpino at scarpino@utexas.edu.

The issue of when and how the moose arrived on Isle Royale is much more than an abstract academic conundrum; it gets at the heart of the historical and scientific meaning of Isle Royale. If moose were deliberately introduced, their presence and their travails reinforce the importance of human agency in making and remaking that place over time. How the moose arrived on Isle Royale also intersects with scientific and historical resource management questions: What is "natural" on Isle Royale? Historically, what has constituted ecological integrity? Where are the lines between wild and not wild; between natural and not natural? How do the answers to these questions relate to defining, restoring, protecting, and preserving ecological integrity on the island? How can the answers to those questions enhance understanding of the interplay between natural and human history on Isle Royale?

Moose have become such an important part of Isle Royale's environment and so highly associated with the meaning of the island that the question of how and why the moose arrived on Isle Royale deserves the same level of scholarly skepticism, careful research, and critical examination as any other significant historical and scientific issue. The results of that research should play a role in information provided to the public and in management of the intertwined and interconnected natural and cultural resources on the island. If people introduced moose to Isle Royale, should that have an impact on resource management? If, historically, caribou were the significant ungulates on Isle Royale, what does that mean for the policy of restoring wildness and wilderness to the island? There are a whole range of reasons why it might not be desirable or practical to restore the island's wilderness qualities by replacing moose with caribou, but that decision should rest on a foundation of accurate information. (By the standards employed today, the moose "invasion" of Isle Royale in the early 20th century—no matter if they walked or swam or got a ride—would earn them the labels "exotic" and "invasive" based upon the amount of environmental damage they inflict-

ed. The fact that people like moose and want to see them has played a role in their fate and their management on the island.)

The crash of the moose population and the heavy damage the desperately hungry moose inflicted on the vegetation argues that pristine wilderness on Isle Royale was more in the eyes of the beholders than a reflection of reality on the ground. Even accepting in the absence of proof that the moose swam or crossed the frozen Lake Superior, the boom and bust in the moose population and the associated environmental damage was as much a result of human management practices as it was a natural process. In their darkest hour, peering into the abyss of extinction on Isle Royale, the moose were almost literally resurrected from the cooling embers of the great Greenstone forest fire of 1936, which itself was the result of a combination of natural and human causes.[34]

The Greenstone forest fire of 1936 offers a useful illustration of the interconnected roles of human and natural history in shaping the landscape of Isle Royale. Wildfire is a relatively rare occurrence on Isle Royale, but three years of drought contributed to conditions that made 1936 the worst fire season of the past century or more on Isle Royale. The ignition, acceleration, spread, size, and destructiveness of the Greenstone fire resulted from an almost "perfect" combination of natural phenomena and human activities. On July 25, a human-caused fire began near Siskiwit Bay in the same area where the Meade Lumber Company was harvesting a large volume of pulp wood. Low fuel moisture caused by prolonged drought helped the fire establish itself and spread from its point of origin. Piles of slash and other logging debris, combined with standing, dead trees killed by an infestation of spruce bud worms, fed the flames and created a massive conflagration. Abundant, dry fuel produced a hot ground fire, which baked the soil and consumed the forest on a large portion of the island.[35]

The Greenstone fire produced a range of impacts, some of which persist to the present. An article in *National Geographic News* in May 2000, analyzing federal fire policy, noted: "One study found that the moose population on Lake Superior's Isle Royale more than quadrupled in the decade following a 1936 fire that burned 26,000 acres. The University of Minnesota's Laurits W. Krefting concluded that fire is the primary agent for maintaining the secondary successional vegetation that moose prefer." The moose population literally rose from the ashes of that fire after a catastrophic population crash caused by a shortage of food. Research summarized by the US Geological Survey on the Greenstone fire and another 1936 fire on Kabetogema Peninsula in Voyageurs National Park concluded that "In many places, the fires burned so hot that entire stands of trees were killed and bare rock exposed," and "the very severe fires of 1936 had a profound impact on the geochemistry of soils that is still apparent today." Rolf Peterson reports in *The Wolves of Isle Royale* on studies of moose teeth collected over a multi-decade period: "Moose, unknowingly acting as biological time capsules, had stored in their teeth a record of large-scale ecological change." Evidence from that research indicates that "the wild fire of 1936 had a major influence on nutrient cycles on the island."[36] At first glance, modern hikers and canoeists might view the former Greenstone burn as a pristine environment. In fact, the forest in a large section of the center of Isle Royale was heavily modified by the Greenstone fire, which itself was a product of natural and human actions.

Eastern timber wolves walked to Isle Royale on the ice in the winter of 1948–1949, but human land managers made the choice to allow them to remain. There is no archaeological evidence of wolves on the island during the long period of occupation by Native Americans, and no scientific evidence of multiple crossings to Isle Royale in the modern period. The wolves that trekked to Isle Royale in the late 1940s could not have picked a location in the United States where they would have been more welcome. Wolves had acquired a bad reputation as ruthless predators and had suffered decades of federal and state government policies that encouraged their extermination. In most other places in the 1940s, wolves colonizing a new location would have been shot on sight. Instead, the timber wolves that wandered over the ice bridge to Isle Royale reached a new national park where hunting was illegal. Park managers thought of the island in wilderness terms and found themselves faced with a rebounding moose population and the memory of the severe crash of the early 1930s. Park officials and their superiors were open to the spontaneous self-introduction of these predators to occupy the heights at the top of the trophic ladder.[37] The combination of wolves and moose arriving on Isle Royale within 50 years of each other and taking up residence on a physically isolated, ecologically simplified island called out for careful scientific study of their evolving interaction.[38]

Wolves on Isle Royale have persisted despite significant problems related to inbreeding and a nearly catastrophic introduction of parvovirus, a disease that affects domestic dogs on the mainland. Parvovirus arrived on Isle Royale either on the boots of hikers or "aboard" a pet dog someone brought to the island, as another biological and human-facilitated connection between the outside and the island. Wolf populations plummeted from a high of around 50 in 1980 to about 14 two years later. The wolves have recovered from the crisis caused by parvovirus, and, so far as public perceptions go, the wolf–moose project has contributed to a sea change in attitudes towards wolves and other predator species. Nonetheless, due to inbreeding the wolves of Isle Royale walk a genetic tightrope suspended above extinction at the same time that the image of the wolf has become an icon of Isle Royale National Park. Rolf Peterson summed up the inbreeding among wolves on Isle Royale in 1999: "Genetic studies revealed that Isle Royale wolves are highly in-bred, all descendants of a single maternal ancestor. Compared to wolves on the adjacent mainland, they have lost genetic variability."[39]

In many ways, managing land to return it to wilderness and preserving cultural resources in a way that respects and protects their significance and integrity are flip sides of the same coin. Preserving wilderness and preserving cultural resources begins with the same questions: What is it that we wish to preserve? Why preserve? What gives remnants of the past value in the present? What constitutes integrity? Preservation of wilderness and of cultural resources both result from present-day people making choices about value and significance. We preserve things not because they are intrinsically important, but because we assign value and meaning to surviving fragments of our natural and cultural heritage. After all, our ancestors struggled mightily to conquer and tame and eliminate wilderness in the belief that productive nature best served human society and that agriculture was the highest use of land. In some cases, careful assessment would lead to the conclusion that wilderness values trump cultural resources. When the federal government established the Bob Marshall Wilderness

in 1964, the US Forest Service became custodian and manager of more than 1,000,000 acres of roadless land in northwestern Montana with very little direct evidence of human impact. Such was not the case on Isle Royale.

Natural and cultural resources are equally important to understanding and interpreting the meaning of Isle Royale. William Cronon poses a central question about the Apostle Islands that also applies to Isle Royale. "In a much altered but rewilding landscape, where natural and cultural resources are equally important to any full understanding of place, how should we manage and interpret these islands so that visitors will appreciate the stories and lessons they hold?"[40]

The fact that moose and especially wolves are relative newcomers to Isle Royale poses some challenging biological problems; that fact also raises policy issues related to the interpretive and management balance between human and natural history—between natural and cultural resources. In *The Wolves of Isle Royale*, Rolf Peterson points out a fundamental management issue: "Thus the NPS policy of maintaining 'native' species cannot clearly guide us in our quandary. In an ironic blend of tradition and history, one might argue that neither the wolf nor the moose are purely 'native' species at Isle Royale." Peterson chides the park's management for its non-interventionist policy in managing an inbred wolf population figuratively walking a tight rope suspended above extinction. "Passive observation," he argues, "can be an easy policy that doesn't require much expense or ecological understanding; perhaps that explains some of its appeal. But our national parks deserve better than rote adherence to tradition."[41] The same sentiment applies with equal force to management policies that threaten either to diminish or to strip away human history and human material culture in an attempt to create a state of "actual" wilderness that the island has not experienced for a very long time.

Isle Royale is a wilderness in progress, a historical wilderness, a "rewilding landscape," shaped by the intertwined forces of human and natural history. Managing Isle Royale National Park as an "actual wilderness" artificially separates the human and natural histories of the Island. It privileges natural history over human history, it elevates the cultural myth of actual wilderness over reality on the ground, and it separates the terrestrial from the aquatic. In so doing, it diminishes the essence of the island. Isle Royale is a maritime park—a place where a "speck" of land surrounded by a sea of fresh water has shaped human and natural history. Thinking about the island as a historical wilderness, instead of wilderness as defined by the Wilderness Act of 1964, can place cultural and natural resources in historic context, highlight their significance and interconnections on Isle Royale, and suggest resource preservation and management strategies that respects the contributions of both to defining the meaning of Isle Royale National Park.

Endnotes

1. This article draws directly on the content and language of the author's historic context, especially portions of pp. 6–33, which offer an introduction and an examination of wildness and wilderness: Philip V. Scarpino, "Cultural Resources on Isle Royale National Park: An Historic Context," unpublished report (Indianapolis: Indiana University–Purdue University Indianapolis, September 2010), online at http://iupui.academia.edu/

PhilipScarpino via the link "Cultural Resources on Isle Royale National Park."

2. Patricia Zacharias, "The Campaign to Preserve Isle Royale," *The Detroit News*, August 11, 1998; online at http://apps.detnews.com/apps/history/index.php?id=191.
3. John J. Little, "Island Wilderness: A History of Isle Royale National Park" (PhD dissertation, University of Toledo, August 1978). Isle Royale National Park archives, Houghton, Michigan (hereafter "NPS Archives, Houghton"). Chapter II, "The National Park Impulse," Chapter III, "New Deal to the Rescue," and Chapter VI, "From Private to Federal Hands, 1935–1940," offer a good overview of the formation of Isle Royale National Park and the role of Albert Stoll and the *Detroit News*. Very useful in understanding the formation of Isle Royale National Park are two photocopied packets of documents titled "Chronological History of the Isle Royale National Park Project." Both are labeled "File Box 2," and both carry the notation: "Return to Albert Stoll, Jr. *The Detroit News*." These packets cover September 1921 to August 6, 1946; NPS Archives, Houghton. A good summary history of Isle Royale may be found in Tim Cochrane, "Isle Royale, 'A Good Place to Live,'" *Michigan History* (May/June 1990).
4. Zacharias, "The Campaign to Preserve Isle Royale."
5. Theodore J. Karamanski and Richard Zeitlin, in their *Narrative History of Isle Royale National Park* (Chicago: Mid-American Research Center, Loyola University of Chicago, February 1988), discuss the connections between the Citizens' Committee of Isle Royale and Albert Stoll (313–316). They also provide an overview of the property ownership situation and the threats posed by lumbering and pulp harvesting, stating on p. 314 that the "Copper Company planned to sell 65,000 acres of island property to the Minnesota Forest Products Company in early 1922." A resolution passed by the Citizens' Committee of Isle Royale in August 1923 identifies the buyer as an Indiana Company. A ledger-type book, "Isle Royale Protective Association (Defunct)" (NPS Archives, Houghton, Cabinet 1, Drawer A), contains a membership list of the Citizens' Committee of Isle Royale, undated but annotated, and membership lists and dues payments for the Isle Royale Protective Association, 1930–1937. Additional material on the role of summer residents, including their motivation and goals, exists in Cabinet 1, Drawer A, NPS Archives, Houghton; see, for example, a letter dated July 3, 1941, with significant marginal notations demonstrating activity up to 1955 (such as the observation that 36 attended a picnic July 23, 1949).
6. Resolution, Cabinet 1, Drawer A, NPS Archives, Houghton.
7. Karamanski and Zeitlin, *Narrative History of Isle Royale National Park,* 314–318.
8. The location of Daisy Farm campground, the Washington Harbor–Washington Island–Windigo area, and McCargoe Cove had discontinuous human occupation for thousands of years. All were sites of prehistoric copper mining, fishing, hunting, and gathering, and all remain in use in the present. On the issue of long-term occupation and use, see Caven P. Clark, *Archaeological Survey and Testing at Isle Royale National Park, 1987–1990 Seasons* (Lincoln, NE: Midwest Archaeological Center, National Park Service, 1995); pp. 37–159 address "Archaeological Sites on Isle Royale," with pp. 73–80, 86–98, and 131–137 providing information on the locations named above.
9. Timothy Cochrane, *Minong: The Good Place—Ojibwe and Isle Royale* (East Lansing:

Michigan State University Press, 2009), 2, 71–72. Clark, *Archaeological Survey,* offers a helpful contextual examination of prehistoric Native American copper mining, working, and trading on pp. 173–179.

10. Clark, *Archaeological Survey*, 173–175.
11. In *Minong: The Good Place*, Cochrane gives 1850 as the high point of Ojibwe presence (105); he also addresses Ojibwe participation in commercial activities related to mining and fishing (96–106).
12. Scarpino, "Cultural Resources on Isle Royale," addresses the American Period of copper mining on Isle Royale (51–68).
13. Scarpino, "Cultural Resources on Isle Royale," examines the commercial fishery on Isle Royale and the Western end of Lake Superior (68–95). Also see Philip V. Scarpino, "Great Lakes Fisheries: International Response to the Decline of the Fisheries and the Lamprey/Alewife Invasion," in *A History of Water, Volume II: The Political Economy of Water,* Terje Tvedt and Richard Coopey, eds. (London and New York: I.B. Tauris, 2006).
14. Thomas P. Gale and Kendra L. Gale, *Isle Royale: A Photographic History* (Houghton, MI: Isle Royale Natural History Association, 1995), 62–63.
15. "Pulp Wood Meade Lumber Company" and "18,000 Cords Pulp Wood 1 Mile Long," Green Album, unfiled, Lawrence Fitzsimmons, NPS Archives, Houghton. Both photos are labeled 1936. Fitzsimmons was a mate on the *USS Beaver*; Gale and Gale, *Isle Royale*, 143.
16. Scarpino, "Cultural Resources on Isle Royale, covers resorts and summer residents (101–127).
17. Rolf O. Peterson, *The Wolves of Isle Royale: A Broken Balance*, 2nd ed. (Ann Arbor: University of Michigan Press, 2007), 57.
18. Alfred Runte, *National Parks: The American Experience*, 3rd ed. (Lincoln: University of Nebraska Press, 1997), discusses the signing of wilderness legislation by President Ford (241–242). Karamanski and Zeitlin, *Narrative History of Isle Royale National Park,* Chapter 8, "Lake Superior's Wilderness Park," 312–348 (figures for acres of wilderness on pp. 340–342).
19. Doug Scott, quoted in *Campaign for America's Wilderness,* reproducing an article by Doug Scott in *The Mining Journal* [Marquette, MI] (March 15, 2007); online at http://www.leaveitwild.org/news/commentary/341. An excellent summary of the decade-long struggle between wilderness advocates and the Park Service may be found in Michigan Environmental Council, "Isle Royale Wilderness: A Silver Anniversary," part of the Council's Michigan Environmental History Project. While sympathetic to the outcome and lacking citations, it offers insight into the role of the wilderness advocates, including Doug Scott.
20. Public Law 94-567, online at http://www.wilderness.net/NWPS/documents/publiclaws/PDF/94-567.pdf; Public Law 88-577 (the Wilderness Act of 1964), online at http://wilderness.nps.gov/document/wildernessAct.pdf.
21. Scarpino, "Cultural Resources on Isle Royale," considers erasure and moldering ruins (141–143). The pattern of creating wilderness and then backing away from policies and

practices of erasure and moldering ruins also took place in other NPS units in the Great Lakes Basin.

22. William Cronon, "The Riddle of the Apostle Islands: How Do You Manage a Wilderness Full of Human Stories?" in *The Wilderness Debate Rages On: Continuing the Great New Wilderness Debate,* Michael P. Nelson and J. Baird Callicott, eds. (Athens: University of Georgia Press, 2008), 634–635.
23. Cochrane, *Minong: The Good Place*, 160, 169–170.
24. George Shiras 3rd, *Hunting Wild Life with Camera and Flashlight: A Record of Sixty-five Years' Visits to the Woods and Waters of North America, Volume 1, Lake Superior Region* (Washington, DC: National Geographic Society, 1935), 189. Since 2009, the explanation of moose colonization of Isle Royale on Isle Royale National Park's official website has changed from "Sometime early in this century, moose immigrated to the island, probably swimming from Canada's mainland," to "Genetic information also suggests that the island's moose population is most closely related to moose in northwestern Minnesota, perhaps challenging the long-held idea that moose swam across the lake to reach Isle Royale. Did humans bring them here?" See http://www.nps.gov/isro/naturescience/index.htm.
25. Clark, *Archaeological Survey*, 213. Rolf O. Peterson, "Letting Nature Run Wild in the National Parks," in Nelson and Callicott, *The Wilderness Debate Rages On*, 652; also, Peterson, *The Wolves of Isle Royale*, 174–175.
26. Shiras, *Hunting Wild Life with Camera and Flashlight*, 187–190, quote on p. 190.
27. Adolph Murie, *The Moose of Isle Royale,* University of Michigan, Museum of Zoology, Miscellaneous Publications no. 25 (Ann Arbor: University of Michigan Press, July 7, 1934), 10.
28. Ibid., 39.
29. Ibid., 41–44, quotes on pp. 42 and 43.
30. Rolf O. Peterson, "Wolf–Moose Interaction on Isle Royale: The End of Natural Regulation?", *Ecological Applications* 9, no. 1 (1999): 10. Peterson cites Murie (1934) and himself (1995), but does not explain how he arrived at the population estimate of 3,000 moose on Isle Royale by the early 1930s.
31. Shiras, *Hunting Wild Life with Camera and Flashlight*, 191, 195.
32. See note 24. Any one who works on the history of Isle Royale will run into anecdotal information that someone who knows someone saw a moose swimming to Isle Royale or heard or read about moose shipped to the Island. This subsurface anecdotal tradition reinforces the need for careful, critical study of how and when moose arrived on Isle Royale.
33. The author asked Samuel V. Scarpino, PhD candidate in biology, University of Texas, Austin, to run some preliminary statistics to determine the probable starting size of the moose population in about 1912 in order to produce populations of several thousand by about 1930. See Figures 2 and Figure 3 and accompanying notes in captions.
34. Peterson mentions the important role of the 1936 fire in bringing back the moose population in "Wolf–Moose Interaction on Isle Royale" (10). Scarpino, "Isle Royale Context," examines the Greenstone fire (28–30).

35. "Fire Management Plan 2004 for Isle Royale National Park," National Park Service, NPS Archives Houghton, Map of burn (17), description (18). This plan uses the name "Greenstone Fire."
36. Donald Smith, in "Los Alamos Sparks Debate on Burn Policy," *National Geographic News* (May 17, 2000), online at http://news.nationalgeographic.com/news/2000/05/0517_alamos.html, discusses the rebounding of the moose population following the fire. See also Laurel G. Woodruff, et al., "Landscape Geochemistry and Forest Fire," in *Impact of Fire on the Geochemistry of the Forest Floor and Mineral Soils, North-Central US*, US Geological Survey, online at http://firescience.cr.usgs.gov/slides/woodruff_geochemsoils2.pdf; and Peterson, *The Wolves of Isle Royale* (56). Peterson mentions the connection between the fire of 1936 and recovery of the moose population in "Wolf–Moose Interaction on Isle Royale" (10).
37. John A. Vucetich and Rolf O. Peterson, "Wolf and Moose Dynamics on Isle Royale," in *Recovery of Gray Wolves in the Great Lakes Region of the United States: An Endangered Species Success Story,* A.P. Wydeven, et al., eds. (New York: Springer, 2009). Their chapter offers insightful background, including a summary of the boom and bust of the moose population between the early 20th century and the 1930s and citations to key scientific studies that address that time period. Vucetich and Peterson also mention a failed attempt to introduce zoo-raised wolves to Isle Royale.
38. In 1958, Durward Allen, Purdue University, and his graduate assistant, Dave Mech, began what would become a continuous wolf–moose study that celebrated its 50th anniversary in August 2008. In 1975, when Allen retired, he turned the project over to Rolf Peterson. Michael P. Nelson, Rolf O. Peterson, and John A. Vucetich, "The Isle Royale Wolf–Moose Project: Fifty Years of Challenge and Insight," *The George Wright Forum* 25, no. 2 (2008): 98–113, offers an overview of the history of the wolf–moose project and an excellent bibliography.
39. Les Line, "In Long-Running Wolf–Moose Drama, Wolves Recover from Disaster," *The New York Times* (March 19, 1996), addresses the issue of parvovirus. Line was an extraordinarily prolific nature writer, especially for the National Audubon Society. See a list of his Audubon Society publications at http://www.bookfinder.com/author/les-line/. Peterson, "Wolf-Moose Interaction on Isle Royale" (12), discusses parvovirus as well.
40. Cronon, "The Riddle of the Apostle Islands" (635).
41. Peterson, *The Wolves of Isle Royale* (170 , 175).

Philip V. Scarpino, Indiana University School of Liberal Arts, Indiana University–Purdue University Indianapolis, 425 University Boulevard, Indianapolis, Indiana 46202; pscarpin@iupui.edu

Restoring the Past: Environmental History and Oysters at Point Reyes National Seashore

Timothy Babalis

Since its inception more than 40 years ago, environmental history has matured into a respected, if somewhat nebulous, discipline in academic circles but has so far received less attention within public land management agencies such as the National Park Service.[1] This is unfortunate, because environmental history can provide information of great practical interest to resource managers as well as offering a valuable perspective on management practices. The singular characteristic which distinguishes environmental history from other historical methodologies is the acknowledgement that history happens in places. Like geographers, whose field is closely related, environmental historians consider the spatial dimension of history to be just as important as its temporal. As a result, the physical environment is one of environmental history's principal subjects, along with the usual human actors, political events, and cultural expressions of traditional history. But environmental history also acknowledges the active capacity of the environment to influence and form human history, as well as being the place where that history unfolds. Environmental historians study the reciprocal relationship between human societies and the physical environments they inhabit. As one prominent environmental historian has written, "When I use the term 'environmental history,' I mean specifically the history of the consequences of human actions on the environment and the reciprocal consequences of an altered nature for human society."[2]

While most environmental historians agree on this basic formula, the field quickly diverges in a bewildering number of directions and becomes increasingly difficult to categorize or define. As some observers have remarked, this may be proof of the field's inherent vitality and its broad relevance to many different historical subjects.[3] But the diversity also makes it necessary to begin any discussion of environmental history by indicating precisely how the term is to be used. In the following example, I propose how environmental history might be applied to the needs and purposes of the National Park Service (and possibly other public land management agencies). Owing to the pragmatic orientation of these needs, I emphasize an approach which begins with the analysis of physical conditions and change over time—the approach used by historical ecologists—and proceed from there to a broader

The George Wright Forum, vol. 28, no. 2, pp. 199–215 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

analysis of historical context and cultural significance. This hierarchy of analysis was suggested by environmental historian Donald Worster in an article first published in 1990. "Before one can write environmental history," Worster observed, "one must first understand nature itself—specifically, nature as it was organized and functioning in past time." Only then does one move to other levels of historical analysis, focusing next on "productive technology as it interacts with the environment," and finally on the "more intangible, purely mental type of encounter in which perceptions, ideologies, ethics, laws, and myths have become part of an individual's or group's dialogue with nature."[4]

Worster's idea has gotten little attention over the intervening decades (perhaps because it would require ecologists and historians to work together), but it remains a useful proposal and seems especially relevant to the needs of public resource managers, who must evaluate the significance of the natural and cultural resources in their care and implement appropriate management protocols. Traditional historical methodologies typically address only the cultural resources of a park; for example, the cannonballs and earthworks associated with a historic battle which took place on the site. But, construed with this emphasis on the land and its natural conditions, environmental history would have to consider the much broader context of the relationship between this hypothetical battle and the physical environment in which it was fought. Why did the battle occur here and not twenty miles further down the road? What advantages did the landscape provide one army versus the other? And how did the battle affect this landscape over time, perhaps guiding future development patterns that would influence how the natural environment would later be utilized and managed?

Although the American West has seen plenty of violence, there are relatively few traditional battlefields (compared with the East), and the emphasis among environmental historians here is therefore not the same. Western historians are more likely to be concerned with such issues as our relationship to the natural environment, Euroamerican relations with indigenous peoples and cultures, and above all resource development, which has been one of the defining themes of the West in American history.[5] Historians have explored this theme through topical studies of mineral extraction, the development of agricultural and pastoral economies, and even urbanization. Environmental history in the West has grown up looking at questions of how the exploitation of natural resources and of the landscapes managed by indigenous cultures has altered the physical environment, and how this changing environment has in turn influenced the modern communities which have grown up within it. The American West has provided an unusually accessible field for studying these questions because of the comparatively recent arrival of Euroamerican settlers and the extensive documentation available to describe their impact. In California, the agricultural history of the Point Reyes Peninsula in western Marin County represents one of the better illustrations of this process, because of the relative continuity in land use practice since the earliest permanent occupation by Euroamerican settlers in the 1850s. This legacy has been preserved in some measure by the National Park Service, which acquired much of Point Reyes from descendents of the original agriculturalists and now maintains substantial portions of the rural landscape and its traditional economy through leases to dairy farmers and beef cattle ranchers. While this arrangement has had critics on every side, few dispute the fact that West

Marin's rural economy could not have survived into the present without the compromises associated with federal intervention.

Early in the 20th century, when Point Reyes was still a remote, working landscape of farmers and dairymen, Charley Johnson settled on Drakes Estero, where he began working for the Coast Oyster Company. Drakes Estero, or estuary, comprises about 2,300 acres of tidal water at the heart of the Point Reyes Peninsula. The main body of the Estero flows into Drakes Bay to the south, while its upper reach divides into five smaller bays, arranged like the fingers and thumb of an open hand. The longest of these—the middle finger of the hand—is Schooner Bay, which takes its name from the cargo vessels which used to load butter and hogs here for shipment to San Francisco. At the head of this bay, not far from where Schooner Creek drains into the Estero, the Coast Oyster Company established an oyster growing and packing operation in 1932, which it called Drakes Bay Oyster Company (Figure 1). Oysters were raised on wooden racks in the tidal waters, then harvested and packed in a small cannery at the shoreline facility. The oysters grown here were not native but a variety known as the Pacific oyster (*Crassostrea gigas*), which had been introduced to the United States from Japan a few years earlier by scientists from the U.S. Fisheries Service (predecessor of the National Marine Fisheries Service) and the California Division of Fish and Game (predecessor of the California Department of Fish and Game). These agencies provided technical assistance to private oystermen, encouraging them to grow the exotic oys-

Figure 1. Drakes Estero from the head of Schooner Bay. Drakes Bay Oyster Company is visible to the left at the bottom corner of the bay. Photo by author, 2010.

ters in several promising locations along the Pacific coast in the hope that they might be able to rejuvenate the now-moribund West Coast oyster industry.[6] The experiment proved successful at Drakes Estero (as well as other locations), and Coast Oyster Company prospered. So, apparently, did Charley Johnson, who in 1957 bought out his employers and took over the Drakes Bay Oyster Company, which he renamed the Johnson Oyster Company.

Even as Johnson was negotiating to purchase Drakes Bay Oyster Company, the National Park Service and local environmentalists were discussing ways to protect Point Reyes under some form of park designation.[7] On September 13, 1962, Point Reyes National Seashore was formally established by Public Law 87-657. Though its legislative boundaries included most of the peninsula (including all of Drakes Estero), the Park Service would not have enough money to purchase most of these lands for another eight years, when a subsequent appropriations bill was passed in 1970 (P.L. 91-223). Two years later, Charley Johnson sold the Johnson Oyster Company to the Park Service, but not wanting to abandon the business, he negotiated a reservation of use and occupancy (RUO) for the land on which his packing facilities stood, and a special use permit (SUP) for his growing and harvesting operation in the Estero. His reserved right was good for forty years—or until 2012—at which time it could theoretically be succeeded by a new lease, provided this did not conflict with existing Park Service regulations.[8] However, this right was abrogated in 1976 by the Phillip Burton Wilderness Act (P.L. 94-567), which designated 25,370 acres at Point Reyes as formal wilderness area, and 8,003 acres as potential wilderness. The latter, which included Drakes Estero, would become full wilderness once existing non-conforming uses were removed. Among these were the Johnson family's commercial oyster operation. Since Congress enjoined the Park Service to "steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status," any extension of the Johnson family's lease would be legally impossible.[9] (This was later confirmed by the Department of the Interior's Solicitor's Office.[10])

After this sale, the Johnson family continued raising oysters on Drakes Estero for another three decades, with Charley Johnson eventually passing the family business on to his son Tom. Under the second generation, however, finances were poorly managed and the operation deteriorated. Inadequate maintenance eventually resulted in numerous code violations, forcing the state to issue a cease-and-desist order. Lacking the means to do anything else, in 2004 Tom Johnson finally threw in the towel with only eight years left on the family's lease. But rather than shut the farm down, Tom sold it to his neighbor, beef cattle rancher Kevin Lunny. This sale was welcomed by staff at the national seashore, who believed that Lunny would be able to do a better job running the oyster farm, given his stronger financial situation and solid reputation for responsible management. Lunny was informed of the limitations on the lease and was even provided a copy of the solicitor's legal opinion. He also was told of the state's cease-and-desist order and promised to improve facilities in order to resolve these violations. The sale was consummated in January 2005, and Kevin Lunny became the new proprietor of the oyster farm, which he rechristened the Drakes Bay Oyster Company after its original name from 1932.[11]

Within a year of taking over the oyster farm, Lunny began to indicate that he wanted to continue the operation indefinitely, despite his earlier assurances to the Park Service that he

had accepted the legislatively mandated closure in 2012. For the most part, Lunny's interest in continuing the oyster operation was expressed informally through the local media and third-party supporters, rather than directly to the Park Service.[12] The survival of the Drakes Bay Oyster Company became a popular concern throughout West Marin for a variety of reasons. On the one hand, the business provided important economic benefits through the jobs it created—it employed 30 full-time laborers—and the tourism it attracted. Even more important, however, was its appeal on a philosophical and moral level to advocates of sustainable, organic food production, who represent a significant constituency in this predominantly rural community. They pointed out that oyster production requires no artificial feed, fertilizers, or chemicals, and little cultivation.[13] It is also very efficient, with Drakes Bay Oyster Company producing approximately 500,000 pounds of oyster meat each year on only 150 acres of tidal water bottoms. Lunny estimates that the equivalent amount of grass-fed beef protein would require 30,000 acres of pasture to raise. He also points out that his oysters are sold locally, so they contribute relatively little to carbon output and energy consumption resulting from motorized transportation.[14] Another important reason for community support was loyalty to the Lunny family, whose association with the Point Reyes Peninsula predates the park by several generations. This created a natural alliance between Lunny and other local ranchers, some of whom were already frustrated with the national seashore and feared that the Park Service was hostile to their interests. The failure to communicate directly probably contributed to this background of misunderstandings and the subsequent intensification of feelings.

The ensuing debate over whether Drakes Bay Oyster Company should be allowed to remain after 2012 largely ignored the legal dimension of this question and focused instead on the ecological impacts of oyster farming on Drakes Estero, even though the solicitor's office had already clearly established that the lease could not be extended without congressional intervention. National seashore staff inadvertently helped steer the controversy in this direction by insisting that the oyster farm was causing damage to the natural environment in order to justify the pending closure of the operation on more than just legal grounds. Both the national seashore and supporters of Drakes Bay Oyster Company turned to science to defend their respective opinions, often drawing contradictory conclusions from the same body of evidence. This precedent was established as early as May 2005, when a park-sponsored assessment of Drakes Estero was published by researchers from the University of California at Davis.[15] Although many of the findings were ambiguous or inconclusive, supporters of the oyster farm interpreted the report to mean that oyster cultivation posed little or no adverse effect on the estero ecosystem, while national seashore staff interpreted the report to mean nearly the opposite. In an ill-conceived attempt to resolve this confusion, the park published an informational brochure on its public web site, providing basic facts about the natural environment of the estero as well as detailed assertions of the negative impacts of oyster farming.[16] These ranged from disturbance of marine mammals to introduction of exotic species.

In response to these assertions as well as to alleged harassment ("disparate treatment") from the park administration, Lunny requested an investigation of Point Reyes National Seashore by the Department of the Interior's Office of the Inspector General (OIG). At about

the same time, senior park staff met with members of the county board of supervisors who, after an acrimonious hearing, agreed to invite California Senator Diane Feinstein to mediate the dispute. The OIG report was completed one year later (in July 2008).[17] While it dismissed the allegations of disparate treatment, it acknowledged that the scientific evidence which the park had presented was exaggerated and, in some instances, misrepresented. At the urging of Senator Feinstein, a further investigation was therefore commissioned by the National Research Council (NRC) of the National Academy of Sciences to study the scientific basis of the dispute. This report, which was published in 2009, brought together much of the known information about oyster mariculture and was generally supportive of the practice, but it also proved unable to resolve the fundamental question, from a scientific point of view, of whether oyster farming should be continued on Drakes Estero (an additional study is currently being conducted by the Marine Mammal Commission).[18] In part, this failure was owing to the fact that science alone cannot resolve what is fundamentally a matter of policy and law. Understanding this, Senator Feinstein subsequently proposed legislative action that would allow Drakes Bay Oyster Company to negotiate a new lease after 2012. When critics challenged this action in Congress, a compromise was reached which gave the final decision to the secretary of the interior. At the time of this writing, the secretary has yet to make his decision.

Where does environmental history enter this story? In early 2006, scarcely a year after taking over the Johnson family lease, Kevin Lunny became involved with a local effort to restore the native Olympia oyster (*Ostrea lurida*) to San Francisco Bay, an unrelated estuarine system about fifty miles south of Drakes Estero. This effort was one among several that were being encouraged and financially supported by the National Oceanic and Atmospheric Administration (NOAA), as well as other restoration specialists from academic institutions and the aquaculture industry.[19] Lunny eventually contributed about $10,000 worth of resources and services to assist this project. In return, he became personally interested in the idea of native oyster restoration and volunteered to host similar experiments at his own lease on Drakes Estero. With the encouragement of marine biologists working on San Francisco Bay, Lunny began to wonder if his own operation, though he raised exotic Pacific oysters (*C. gigas* rather than *O. lurida,* which is native to the Pacific coast from California to British Columbia), might actually replicate conditions that many believed had existed on the estero prior to historic disturbances in the mid-19th century. The idea that native oysters had once been common in Drakes Estero was based largely on an unsubstantiated comment from an article published in the *Journal of Shellfish Research* ten years earlier.[20] Although Lunny may have understood that this restoration scenario was only conjectural, he wanted to test its validity by reintroducing large numbers of *O. lurida* into the estero to see if they would take. At the time, only trace quantities of this species were thought to be present here, and national seashore administrative staff refused Lunny's request, reasoning that this evidence was not sufficient to support his theory. (The Park Service may also have been unwilling to endorse any long-term experiments which would extend beyond 2012.[21]) Although Lunny respected the Park Service's decision, he continued to believe that his own mariculture operation was ecologically restorative and might even be consistent with the wilderness values which the Park Service was mandated to protect after 2012. This suggested a powerful argument in

favor of continuing the commercial oyster operation beyond its scheduled expiration, but for the time being, the question of native oysters remained little more than a side issue in the larger debate over preserving Drakes Bay Oyster Company.[22]

When the National Research Council published its report in 2009 on the ecological impacts of oyster farming on Drakes Estero, it concluded that there was insufficient evidence to show that the effects were negative. This was hardly surprising. But the NRC also asserted that *O. lurida* had once represented a significant component of the estero ecosystem before being extirpated by historic overharvesting. While the NRC carefully avoided making any specific recommendation about whether the commercial oyster operation should be allowed to continue, it did conclude that the presence of exotic Pacific oysters (*C. gigas*) might replicate historic baseline conditions and provide the same or similar ecosystem services that native populations of Olympia oysters (*O. lurida*) might once have provided. In essence, the NRC supported Lunny's conjecture that modern oyster farming on the estero was equivalent to a restoration of natural processes (or that it could be made to be equivalent with appropriate management practices). This moved the issue of restoration to the center of the debate, and in doing so elevated the importance of history—specifically environmental history—as a means of validating claims about baseline reference conditions. The conclusions drawn from the historical account could have potentially significant ecological as well as economic implications.

While the NRC claimed that the Park Service failed to acknowledge the past existence and subsequent extirpation of native Olympia oysters from Drakes Estero, the authors of the report themselves possessed little evidence to support these assertions.[23] In response, therefore, the Park Service initiated its own investigation into the past relationship between native oysters and Drakes Estero based on what could be learned from historical and archaeological evidence.[24] The archaeology that principally interested investigators were middens—garbage dumps—that were deposited by the indigenous Coast Miwok, often over thousands of years. Since much of the material in these middens is associated with food consumption—seashells and animal bones—archaeologists are able to draw important conclusions about the diet of a particular community and, by inference, what was available in the local environment where they lived. Moving vertically through the midden strata, researchers can also infer how this diet varied over time as the habitat changed or as individual resources were overexploited.

Examples of this type of evidence could once be found in enormous shellmounds on San Francisco Bay, especially along the eastern shoreline between San Leandro and Richmond. Most of these middens were destroyed by modern development after World War II, but extensive archaeological investigations were made prior to these events during the first half of the 20th century. This research demonstrated that *O. lurida* comprised an important part of the Native American diet in the distant past, since shells of this species were common in the lowest strata of many of the shellmounds, which originate as early as 5700 BP (years before the present time).[25] Interestingly, these shells decline substantially toward the upper strata of the same shellmounds, largely disappearing by a point corresponding to approximately 2000 BP, which suggests that *O. lurida* became increasingly rare in San Francisco Bay during the recent two millennia. This could be explained either by overharvesting or by natural fluctuations in habitat conditions (changes in water temperature, relative salinity, or

bottom sedimentation, all of which strongly affect oyster viability).[26] At a very minimum, this evidence shows that *O. lurida* are native to San Francisco Bay—they are still found in small quantities today—though the archaeological data also suggest that significant changes in the relative abundance have occurred over time. (Further investigation might reveal important nuances in areal distribution as well.)

Investigation of archaeological sites on Drakes Estero provides similar information about the past composition of the resource base utilized by Native American inhabitants (in this case, the Coast Miwok). One of the more significant differences between San Francisco Bay and Drakes Estero revealed by this evidence is the near-absence of any oyster shells in the latter location. Seventeen documented midden sites are located on Drakes Estero. Those that have been dated are estimated to have originated at least 2,000 years ago, and possibly earlier. Oyster shells have been found at only three of these sites. The first (site number CA-MRN-296) lies nearly adjacent to the Drakes Bay Oyster Company's main facility, and numerous exotic oyster shells (primarily *C. gigas*) from the commercial operation have been deposited on top of the heavily disturbed midden. Surface reconnaissance suggests that these are the dominant constituent of the deposit, but extensive subsurface excavations have not been made to determine whether *O. lurida* shells may exist in lower strata. (Recent investigations, the results of which have not yet been published, have confirmed the existence of relatively small quantities of native *O. lurida* shells here but have also shown that none of these fragments are of recent origin, the youngest dating from earlier than 1100 BP.) At another site (CA-MRN-242), small quantities of *O. lurida* shells were positively identified by at least two archaeologists in previous surveys, but both investigators also noted that the midden had been disturbed by a small shack and associated agricultural activities dating from the early historic period, possibly compromising the reliability of the evidence. (More recent investigations have confirmed the identity of *O. lurida* shells sampled from this site but found that none date from later than 1400 BP.) Native oyster shells were also identified at the third site (CA-MRN-230), which appears undisturbed, but the quantity of shells recovered here was less than 1% of the total weight of the sampled midden contents. (No samples from this site have yet been dated.) The apparent paucity of oyster shells on Drakes Estero cannot be attributed simply to the dietary preference of the indigenous Coast Miwok, since other locations more conducive to oysters show abundant evidence of oysters shells in prehistoric middens (for example, on San Francisco Bay), but instead suggest that oysters never constituted a significant element of the local environment, at least not within the past 1,000 years.[27] This conclusion is supported by ethnographic sources, which appear to corroborate the archaeological evidence. In interviews conducted during the early 1930s by anthropologist Isabel Kelly, Coast Miwok elder Tom Smith related that shellfish were traditionally significant sources of food for his people but also noted that oysters were not among the species typically gathered because they were not locally abundant. According to Smith's testimony, mussels and various types of clams were far more common and consequently more important to the Coast Miwok.[28]

The predominant species represented in the Drakes Estero middens are clams, especially the California butter clam (*Saxidomus nuttalli*) and Pacific gaper (*Tresus nuttalli*). This is to be expected, because both species are associated with soft-bottomed environments like

Drakes Estero, while *O. lurida* requires a hard substrate on which to grow. Drakes Estero was formed approximately 8,000 years ago when rising seas drowned a late Pleistocene river drainage. The floor and surrounding shoreline is now comprised almost entirely of soft sediment—sand and mud—which has been deposited over the subsequent millennia. The original river channel, which sits on bedrock, lies between 10 and 35 meters (nearly 100 feet) below the estero floor. Apart from the artificial racks that have been constructed to support the commercial oyster operation, there is very little hard substrate or exposed rock within Drakes Estero today. By contrast, San Francisco Bay possesses a much wider variety of habitats, including many areas where rocky outcrops can be found obtruding into the water. Deep core samples taken by scientists at various locations around Drakes Estero have found no evidence of oysters within the depositional strata.[29]

Historical records provide another source of information about the past composition of the estero ecosystem, though history has more to say about the forces that may have changed this environment than about the environment itself. Among the claims made by the NRC report was that historical overharvesting had extirpated a native population of *O. lurida* in Drakes Estero. While archaeological and physical evidence suggests that no such population existed, historical evidence corroborates this conclusion by its absence: there is no documented evidence that any significant harvest of native oysters ever took place in Drakes Estero during the early historic period. By 1851, only three years after the beginning of the mass immigration of gold miners to California, local oystermen in San Francisco were trying to satisfy the burgeoning demand for oysters, which far outstripped the supply found in the bay, by importing native oysters (i.e., *O. lurida*) from Shoalwater Bay (now Willapa Bay), Washington, more than 750 miles to the north, the implication being that no closer source of marketable oysters existed (Figure 2). This is confirmed in the memoirs of one of the largest and most successful of the early oystermen, John Stillwell Morgan, who surveyed the entire Pacific coast over the next decade and found no sizeable oyster populations closer to San Francisco than Washington to the north and Baja California to the south.[30] (The Baja population was a separate species, *Ostrea conchaphila*, which proved difficult to transport and could not be commercially developed for the San Francisco market.)

Morgan never mentions Drakes Estero, though he could hardly have missed the place in his survey, since it lies only 50 miles north of San Francisco. Nevertheless, the NRC investigators inferred that the Shoalwater Bay trade was initiated in response to the exhaustion of local resources. They based this assertion on a theoretical model which was developed to explain the extension of the East Coast oyster industry to increasingly distant sources as local supplies of native oysters were overharvested and depleted.

But in the East, this process was associated with a well-established industry and occurred over a period of nearly two centuries (from the beginning of the fishery in the mid-17th century to its initial collapse in the early 19th century).[31] In the West, the hypothetical exhaustion of local oyster sources would have had to occur within the space of only three years (from 1849 to 1851). Moreover, there is no documented evidence that an organized industry for harvesting or cultivating oysters existed during this brief time. Morgan describes only informal foraging of a diminutive and unpalatable variety of *O. lurida* which was then found in San Francisco Bay. He judged the prospects for exploiting this resource to be

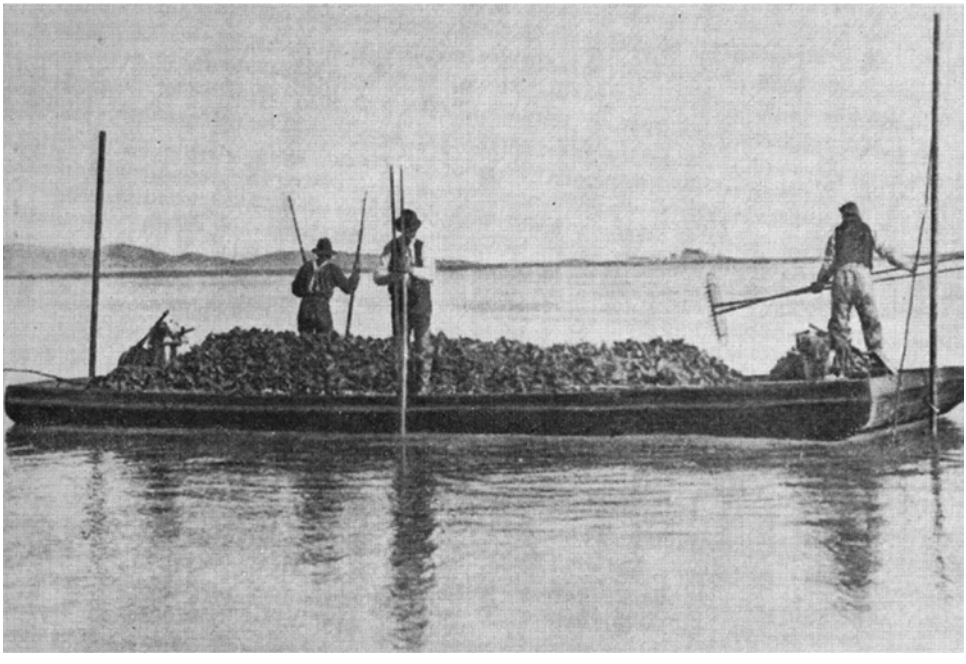


Figure 2. Harvesting oysters (probably *Crassostrea virginica* imported from the East) on San Francisco Bay in the late 19th century using long-handled tongs. Photo by Charles H. Townsend, 1893.

impractical and instead chose to import oysters from much further away at considerable cost. It would take nearly 40 years (until 1890) to exhaust the native Shoalwater Bay oyster beds which he and other California oystermen harvested for the San Francisco market. Had any significant population of oysters been concentrated in local waters, it seems improbable that they could have been overharvested in less than a tenth of that time. Even less likely is the possibility that a native population in Drakes Estero was also depleted during the same period but never documented in the historic records. After Morgan's initial survey from the 1850s, Drakes Estero would not be considered for oysters again until the early 1930s, when state and federal biologists visited the estero while searching for likely places to introduce the exotic Pacific oyster (*C. gigas*) for commercial cultivation. The investigators found no native oysters growing here at that time.[32]

The conclusions that can be drawn from this analysis seem fairly obvious. Based on archaeological, ethnographic, and historical evidence, there is little reason to believe that any significant population of native oysters (*O. lurida*) ever existed in Drakes Estero. These findings are consistent with the physical character of the estero, which offers little natural habitat favorable to oysters. This is not the case with many other locations on the Pacific Coast, where habitat does exist, for example, within San Francisco Bay (or portions of it), in nearby Tomales Bay, and further north in places such as Willapa Bay (Shoalwater Bay), Washington. Estuarine systems along the Pacific Coast differ markedly in character from one another, with some providing oyster habitat and others not, usually because, like Drakes Estero, their shorelines and bottoms are too soft and support burrowing mollusks instead. Morgan,

for one, quickly learned how irregularly the native oyster was distributed up and down this coast. One of the more surprising problems of the NRC report is its tendency to overlook this natural variability and instead to generalize broadly about physical conditions throughout the entire Pacific region. The authors' claims about the past existence and subsequent extirpation of native oysters at Drakes Estero were based almost solely on such erroneous methods. For example, the report contains a photograph (Figure 3) of a native oyster reef in Nootka Sound, British Columbia (Canada), with an explanation that this scene represents what Drakes Estero might have looked like prior to historic disturbances.[33] But Nootka Sound lies more than a thousand miles to the north, and its environment is very different from that of Drakes Estero, as even a casual glance reveals.

One of the first tasks of environmental history, as this example from Point Reyes suggests, is to provide an accurate description and understanding of past conditions within a given place. On this basic level of analysis, environmental history adopts the methodology and objectives of historical ecology, an allied discipline which has developed primarily within the natural sciences, especially among restoration ecologists.[34] The value of historical ecology has already been demonstrated through many examples, which in most cases have been implemented in response to the practical needs of resource managers.[35] Historical ecology provides a valuable perspective on several important questions relating to Drakes Estero; for example, what is the environmental impact of commercial oyster farming? And should restoration of natural processes within the estero include the introduction of oysters (of any species)? The first question is much larger than the scope of the present discussion, encom-

Figure 3. Photograph of Nootka Sound, British Columbia, used by the NRC (Peterson et al. 2009) to indicate "conditions that may have prevailed at Drakes Estero prior to the mid-1800s." Reproduced by permission of Michael Beck of The Nature Conservancy.

passing a number of other concerns such as the disturbance of marine mammals by oyster farm operators, introduction of exotic invasive species, and modification of natural sedimentation regimes, among others. But to the extent that the present mariculture operation claims to replicate the natural ecosystem services of a native oyster population, historical ecology can provide useful answers. The conclusions drawn from this analysis suggest that the commercial cultivation of oysters represents a significant modification of the estero ecology from conditions that likely prevailed prior to the historic period. This would be true even if the oysters being cultivated were the native *O. lurida*, as proprietor Kevin Lunny has tentatively proposed.

The second question can be addressed even more directly by historical ecology. The absence of any convincing evidence that a significant population of native oysters ever existed in Drakes Estero argues against their present or future introduction for restoration purposes. The National Park Service is required by policy to manage for natural conditions in proposed or designated wilderness areas, and to restore those conditions (if at all practical) when they have been disrupted by historic human activities. While historical ecology has little to say as to how policies are interpreted or applied, it does provide the information needed by resource managers to establish reference conditions for which these policies obligate them to manage. If Point Reyes National Seashore is to restore Drakes Estero to natural conditions, then it will have to remove the oysters that have been unnaturally introduced (barring any legislative decision which overrides park policy).

Historical ecology, however, represents only one facet of environmental history. Following the methodology suggested by Donald Worster, a more complete account would have to address at least two additional levels of analysis. After looking simply at the physical conditions of past times, the next level would address how the land (and water) have been used for productive purposes during successive historic periods. For example, during the late 19th and early 20th centuries, Drakes Estero was a working environment which was exploited for profit. Though the estero was not used at that time for maricultural purposes, it was employed as a transportation artery for goods raised on adjacent farms, providing access to San Francisco markets for schooners that carried valuable commodities like butter, cheese, and hogs. During the latter 20th century, Point Reyes began to be valued for its recreational opportunities, and local relationships to the land changed accordingly. People began coming to Point Reyes to enjoy its natural amenities, especially its apparent isolation from urban life. From these values came the impetus to establish the national seashore in 1962. In 1964, the Wilderness Act was passed, and 12 years later a substantial portion of Point Reyes National Seashore was designated a wilderness area (or potential wilderness) under the terms of this legislation. This represented a new stage in the evolution of recreational use of the environment and would produce, as events later proved, a conflict with prior forms of productive engagement. A few decades later, another type of relationship would emerge with the sustainable food production movement. This was closely allied with earlier economic relationships but included the novel, and ultimately very powerful, addition of the moral obligation to support ecologically responsible growing practices. Despite the shared ecological theme, this fundamentally agrarian ethic and the values represented by the Wilderness Act would come to loggerheads, with Drakes Estero at the center of the conflict.

A third and final level of analysis provided by environmental history would address how cultural values have affected and determined productive uses over time. In the present example, both wilderness and sustainable food production represent value systems as much as they do productive activities. These values emerged in other geographical contexts but now strongly influence land management decisions and practices at Point Reyes. At the same time, local contingencies here affect and occasionally modify these values; for example, our understanding of wilderness may not be the same as a result of the present controversy. Culture is related to the landscapes on which it is expressed, though the connection is not always direct or immediately obvious, and environmental history must address this more ephemeral dimension of human activity, because culture has significant implications for the ways that individual humans and human societies choose to interact with the land on which they live. In turn, the land can also shape human culture and contribute to the forms culture ultimately takes.

We do not yet have an adequate account of the controversy over oyster farming at Point Reyes, because so far all of these historical dimensions have yet to be fully addressed. The National Research Council's report, and the Park Service's response to it, have addressed only the dimension of historical ecology, the question of past physical conditions. But the history of productive human relationships with the land and of the cultural values that have supported these relationships remains to be written. A more complete historical account that incorporates these additional perspectives might contribute to a better understanding of the present controversy and help guide both the park and local community toward a resolution of their differences. While this will take far more than just history, any genuine effort toward a lasting solution must depend upon accurate historical knowledge. A well-conceived environmental history of Drakes Estero would give an account of the various systems of value which have recently come into conflict—each represents a particular understanding of what the land means and has grown out of a historical association with the land itself. By articulating these understandings and their respective foundations in the past, history can demonstrate the legitimacy of opposing points of view and provide a basis for mutual respect. This does not necessarily lead to agreement, but it at least identifies what each disputant believes to be fundamentally at stake. From this improved basis of understanding, a more productive discussion may result.

Point Reyes provides only one example of how and why environmental history should be important to the National Park Service. But the questions and the controversy that have ensued over Drakes Estero are not unique. This model of environmental history offers practical benefits for other parks as well. The significance of restoration as a land management policy throughout the Park Service requires resource managers to utilize historical ecology, the most basic level of environmental history, as a means of understanding past environmental conditions. But environmental history can also contribute to an understanding of landscape change by describing the successive modes of productive relationship that have existed over time between humans and their environment. This level of analysis also identifies the various communities of people with historic relationships to the land and describes the character of those relationships. And finally, environmental history can identify the cultural values that are associated with particular modes of engagement. In doing so, it describes not

only how these values have expressed themselves through their impacts on the land, but also how the land has subsequently impressed itself on the people who made the impacts.

Endnotes

1. For representative discussions of the field, see Donald Worster et al., "Environmental History: A Roundtable," *Journal of American History* 76 (1990): 1087–1147; William Cronon, ed., *Uncommon Ground: Rethinking the Human Place in Nature* (New York: W.W. Norton & Co., 1995); and Thomas R. Cox, "A Tale of Two Journals: Fifty Years of *Environmental History*—and Its Predecessors," *Environmental History* 13, no. 1 (2008): 9–40.
2. Richard White, "Trashing the Trails," in *Trails to a New Western History*, ed. Patricia Nelson Limerick, Clyde A. Milner, II, and Charles E. Rankin (Lawrence: University Press of Kansas, 1991).
3. Douglas R. Weiner, "A Death-Defying Attempt to Articulate a Coherent Definition of Environmental History," *Environmental History* 10, no. 3 (2005): 404–420.
4. Donald Worster, "Transformations of the Earth," reprinted in *The Wealth of Nature: Environmental History and the Ecological Imagination* (Oxford, UK: Oxford University Press, 1993).
5. For example, Patricia Nelson Limerick, *The Legacy of Conquest: The Unbroken Past of the American West* (New York: W.W. Norton, 1987); Earl Pomeroy, *The Pacific Slope: A History of California, Oregon, Washington, Idaho, Utah, and Nevada* (New York: Knopf, 1965), and many others.
6. Paul Bonnot, "The California Oyster Industry," *California Fish and Game* 21, no. 1 (1935): 65–80; and Elinore M. Barrett, *The California Oyster Industry*, Fish Bulletin no. 123 (Sacramento, CA: The Resources Agency of California, 1963).
7. Paul Sadin, *Managing a Land in Motion: An Administrative History of Point Reyes National Seashore* (Point Reyes Station, CA: National Park Service, Point Reyes National Seashore, 2007).
8. Neal Desai, *Drakes Estero: Legal Analysis on Wilderness Designation* (Washington, DC: National Parks Conservation Association, n.d.).
9. House Committee on Interior and Insular Affairs, *Report to Accompany H.R. 8002*, 94th Cong., 2d sess., 1976, H. Rept. 94-1680.
10. Memorandum Opinion, Field Solicitor, San Francisco Field Office, to Superintendent, Point Reyes National Seashore, February 26, 2004.
11. Much of this information is based on the *Investigative Report* of the Office of the Inspector General (2008). See note 17 below.
12. Correspondence of Kevin Lunny and Nancy Lunny to Dr. Susan Roberts, Executive Director, Ocean Studies Board, National Academy of Sciences, February 11, 2009; and Peter Jamison, "Park Service to Close Oyster Farm," *Point Reyes Light*, February 23, 2006.
13. "Save the Drakes Bay Oyster Farm," Alliance for Local Sustainable Agriculture, accessed February 24, 2010, http://www.alsamarin.org/dboc.htm.
14. "What Drakes Bay Oyster Means to Our Community," Drakes Bay Family Farms,

accessed February 26, 2010, http://drakesbayfamilyfarms.com/community.htm.

15. D.L. Elliott-Fisk, S. Allen, A. Harbin, J. Wechsler, D. Schirokauer, and B. Becker, *Assessment of Oyster Farming in Drakes Estero, Point Reyes National Seashore: Final Report* (Point Reyes Station, CA: Point Reyes National Seashore, May 2005).
16. Point Reyes National Seashore, "Drakes Estero: A Sheltered Wilderness Estuary," February 9, 2007; Much of the same information relating to the alleged impacts of the oyster company also appeared in the local newspaper: Sarah Allen, Jules Evens, and John Kelly, "An Irreplaceable Coastal Wilderness," *Point Reyes Light*, April 26, 2007.
17. US Department of the Interior, *Investigative Report: Point Reyes National Seashore* (Washington, DC: US Department of the Interior, Office of Inspector General, 2008).
18. Charles H. Peterson et al., *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California* (Washington, DC: National Academies Press, 2009).
19. NOAA Restoration Center, "San Francisco Bay Oyster Restoration," February 23, 2004; Bud Abbot, "Indigenous Oyster Habitat Project," accessed May 21, 2009, http://www.marinrodandgunclub.com/Oyster Habitat02.htm.
20. Patrick Baker, "Review of Ecology and Fishery of the Olympia Oyster, *Ostrea lurida*, with Annotated Bibliography," *Journal of Shellfish Research* 14, no. 2 (1995): 501–518. Baker included Drakes Estero as one of the historic locations of *O. lurida* populations on the Pacific coast based on the comment made by Charley Johnson that this species was "common but not abundant" here. Johnson's observation comes more than sixty years after the introduction of oyster mariculture on the estero and is not corroborated by any other source.
21. Sam Spiewak, "Largest Oyster Restoration in California: Lunny's Shells Clean S.F. Bay," *Point Reyes Light*, August 12, 2006; Carl Hall, "San Francisco Bay Shell Game for Oysters," *San Francisco Chronicle*, August 14, 2006; and Peter Jamison, "Native Oyster Research in Drakes Estero Will Not Go Forward," *Point Reyes Light*, May 25, 2006.
22. Most discussion focused on whether the commercial operation had an adverse impact on marine mammals, which regularly use the estero sand bars for hauling out and pupping.
23. The report states that the "NPS does not acknowledge the changing ecological baseline of Drakes Estero, in which native Olympia oysters probably played an important role in structuring the estuary's ecosystem for millennia until human exploitation eliminated them in the period from the mid 1800s to the early 1900s" (Peterson et al., *Shellfish Mariculture*, 3).
24. Mark Rudo, "Little Archaeological Evidence of the Olympia Oyster (*Ostrea lurida*) at Drakes Estero, Point Reyes National Seashore, California," unpublished paper, National Park Service, Pacific West Regional Office, Oakland, CA, September 4, 2009; and Timothy Babalis, "Critical Review: A Historical Perspective on the National Research Council's Report 'Shellfish Mariculture in Drakes Estero,'" unpublished paper, National Park Service, Pacific West Regional Office, Oakland, CA, August 11, 2009.
25. For example, at the West Berkeley shellmound (CA-ALA-307), *O. lurida* shell comprised 44.1% of the total quantity by weight of shells found in the lowest strata. The same species declined to approximately 10% in the uppermost strata. Robert E.

Greengo, "Molluscan Species in California Shell Middens," *Reports of the University of California Archaeological Survey* 13 (December 10, 1951). On the dating of the San Francisco shellmounds, see B. Lynn Ingram, "Differences in Radiocarbon Age Between Shell and Charcoal from a Holocene Shellmound in Northern California," *Quaternary Research* 49 (1998): 102–110; and Kent Lightfoot, "Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay," in *Archaeology of the California Coast during the Middle Holocene*, ed. Jon Erlandson and Michael Glassow (Berkeley: University of California, Institute of Archaeology, 1997).

26. On the possibility of overharvesting, see Jack Broughton, "Widening Diet Breadth, Declining Foraging Efficiency, and Prehistoric Harvest Pressure: Ichthyofaunal Evidence from the Emeryville Shellmound, California," *Antiquity* 71 (1997): 845–862. On changes in relative salinity and water temperature, see Jack Meyer, "An Overview of Geoarcheological Research Issues," in *Archaeological Research Issues for the Point Reyes National Seashore—Golden Gate National Recreation Area*, ed. Suzanne Stewart and Adrian Praetzellis (Rohnert Park, CA: Sonoma State University, 2003), I:6; and B. Lynn Ingram and Donald J. DePaolo, "A 4300 Year Strontium Isotope Record of Estuarine Paleosalinity in San Francisco Bay, California," *Earth and Planetary Science Letters* 119 (1993): 103–119. Since the shellmounds show a corresponding increase in species associated with soft-bottomed environments, increased sedimentation of the bay habitat is a likely explanation (Greengo, "Molluscan Species").
27. This overview is taken from Mark Rudo, "Little Archaeological Evidence."
28. Mary E.T. Collier and Sylvia Barker Thalman, eds., *Interviews with Tom Smith and Maria Copa: Isabel Kelly's Ethnographic Notes on the Coast Miwok Indians of Marin and Southern Sonoma Counties, California* (San Rafael, CA: Miwok Archaeological Preserve of Marin, 1991).
29. Roberto J. Anima, *Pollution Studies of Drakes Estero and Abbotts Lagoon, Point Reyes National Seashore, California, USA* (Point Reyes Station, CA: National Park Service, Point Reyes National Seashore, 1990).
30. David R. Sessions, "John Stillwell Morgan Dictation and Biographical Sketch," typescript, 1888, Bancroft Library, Berkeley, CA.
31. Michael X. Kirby, "Fishing Down the Coast: Historical Expansion and Collapse of Oyster Fisheries Along Continental Margins," *PNAS* 101, no. 35 (2004): 13096–13099.
32. Paul Bonnot, *California Oyster Industry*.
33. Peterson et al., *Shellfish Mariculture*, 20.
34. Thomas W. Swetnam, Craig D. Allen, and Julio L. Betancourt, "Applied Historical Ecology: Using the Past to Manage for the Future," *Ecological Applications* 9, no. 4 (1999): 1189–1206; Dave Egan and Evelyn A. Howell, eds., *The Historical Ecology Handbook: A Restorationist's Guide to Reference Ecosystems* (Washington, DC: Island Press, 2005).
35. Some examples include: Eric D. Stein et al., *Historical Ecology and Landscape Change of the San Gabriel River and Floodplain,* Southern California Coastal Water Research Project (SCCWRP) Technical Report no. 499, February 2007; Robin Grossinger et al., *South Santa Clara Valley Historical Ecology Study* (Oakland, CA: San Francisco

Estuary Institute, 2008); and Brian D. Collins, David R. Montgomery, and Amir J. Sheikh, "Reconstructing the Historical Riverine Landscape of the Puget Lowland," in *Restoration of Puget Sound Rivers*, ed. David R. Montgomery et al. (Seattle: University of Washington Press, 2003). The National Park Service study of Drakes Estero was not cartographically focused, as these examples are, but its principal purpose was also to provide knowledge about past physical conditions.

Timothy Babalis, Fort Vancouver National Historic Site, 612 East Reserve Street,Vancouver, Washington 98661; timothy_babalis@nps.gov

The State of Climate Change Adaptation in Canada's Protected Areas Sector

Christopher J. Lemieux, Thomas J. Beechey, Daniel J. Scott, and Paul A. Gray

Ed. note: Because of space limitations in this issue, a companion piece by the same set of authors, "A Model Process for Developing Adaptation Options for Natural Heritage Areas in an Era of Rapid Climate Change," will appear in the next edition of The George Wright Forum.

Introduction

Protected areas were first established to preserve scenic wonders and tourist attractions. In recent years, the rationale has evolved to become a cornerstone of biodiversity conservation and ecological sustainability, as well as an important barometer of world ecosystem health and human condition (CBD 1992; Millennium Ecosystem Assessment 2005; Government of Canada 2009). As of 2010, Canada's terrestrial protected areas number more than 4,850 spanning 101.2 million ha and representing 9.92% of Canada's total land base (Figure 1; CCEA 2010). In addition, approximately 45,280 sq km (0.12%) of Canada's oceans are protected (CCEA 2010). Collectively, the establishment and management of protected areas are central to Canada's commitment to Article 8 on "In-situ Conservation" of the United Nations (UN) Convention on Biological Diversity (CBD 1992). Climate change has begun to impact critical, once relatively stable, climate regions and is now recognized to be one of the most serious threats to biodiversity and the conservation thereof (CCME 2003; Root et al. 2003; Thomas et al. 2004; IPCC 2007b; Lemmen et al. 2008; CBD 2009). Both the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) and Canada's national synthesis on climate change, *From Impacts to Adaptation: Canada in a Changing Climate 2007* (Lemmen et al. 2008), have clearly substantiated that climate change induced by human-generated greenhouse gas (GHG) emissions is now implicated in a myriad of coincident impacts: perturbations in regional temperature regimes and precipitation patterns, severe weather events, sea level rise, and changes in ecosystem composition, structure, and function (IPCC 2007a, 2007b; Lemmen et al. 2008).

Parks and other forms of protected areas in Canada have a wide range of management objectives, including the permanent protection of representative ecosystems, biodiversity,

The George Wright Forum, vol. 28, no. 2, pp. 216–236 (2011).

ISSN 0732-4715. Please direct all permission requests to info@georgewright.org.

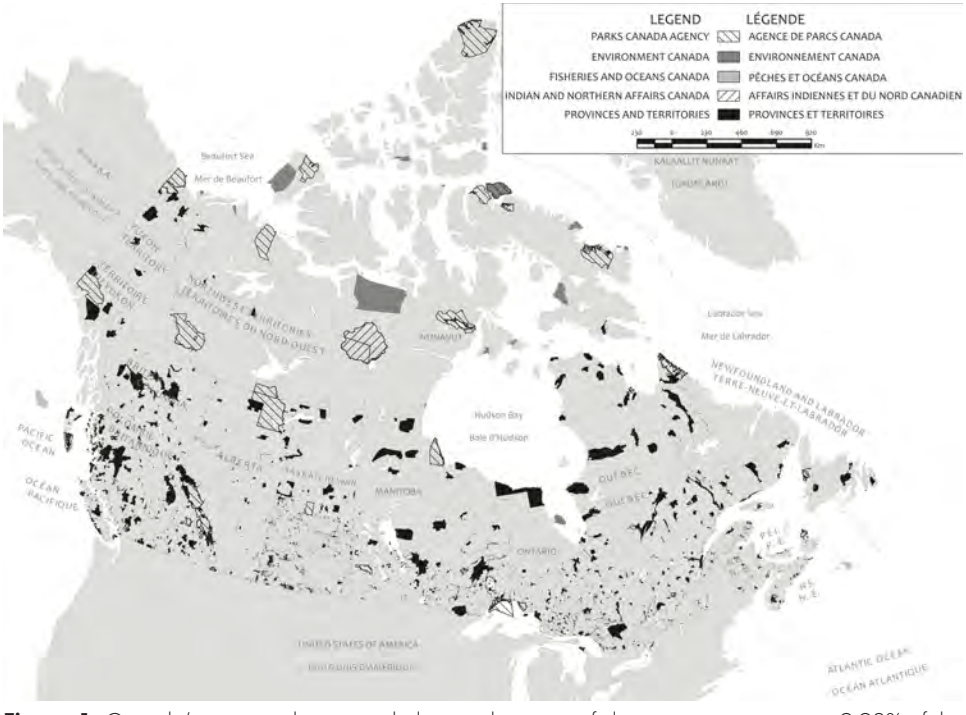


Figure 1. Canada's protected areas include a wide range of designations comprising 9.92% of the area of the country. Small sites are not conspicuous for southern Ontario and other southern settled regions due to limitations of scale. Source: CCEA 2010.

and other significant elements of natural and cultural heritage values, and the provision of opportunities for outdoor recreation, education, and appreciation of natural and cultural heritage, all of which will be affected by climate change. In ecological terms, the anticipated shifting of species distributions—consequences less commonly visible than impacts on human settlements and livelihoods—may well have the most devastating long-term impacts. Bioclimatic envelope projections of future flora and fauna distributions in Canada and elsewhere suggest that species hosted in parks and other forms of protected areas of the future will bear little resemblance to those of today (e.g., Henderson et al. 2002; Malcolm, Liu, et al. 2002; Malcolm, Markham, et al. 2002; Scott et al. 2002; Hamann and Wang 2005; Lemieux and Scott 2005; Malcolm et al. 2006; McKenney et al. 2007a, 2007b; Lawler et al. 2009). Furthermore, evidence from virtually all meta-analyses on species response to climate change overwhelmingly suggests that species will be impacted negatively, possibly resulting in levels of mass extinction (e.g., Thomas et al. 2004; Malcolm et al. 2006; IPCC 2007b). For example, the IPCC (2007b) has suggested that approximately 20–30% of Earth's plant and animal species are likely to be at increased risk of extinction if increases in global average temperatures exceed 1.5–2.5°C. Furthermore, according to Pounds and Puschendorf (2004) and others (e.g., Opdam and Wascher 2004), estimates of species extinction resulting from climate change may be optimistic when the synergistic effects of habitat fragmentation, habitat destruction, and climate change on the landscape are considered.

Indeed, as fixed assets established to conserve samples of ecosystems and species, protected areas worldwide are vulnerable to the shifting ecological matrix induced by climate change. It is conceivable that the synergistic effects of climate change and other incompatible land-use practices could render many protected areas as "conservation deathbeds" if adequate adaptation measures are not put in place. As a result of these potential outcomes, climate change has been increasingly recognized as a key emerging issue for agencies and organizations responsible for the management of parks and other forms of protected areas (e.g., Hannah et al. 2002; Scott et al. 2002; Lemieux and Scott 2005; Welch 2005; Baron et al. 2009; Heller and Zavaleta 2009; West et al. 2009).

To that end, this article examines three aspects: (1) what climate change impacts are currently perceived by Canadian protected areas agencies and organizations to be affecting or anticipated to affect protected areas across Canada; (2) the perceived importance of climate change relative to other protected areas management issues in Canada; and (3) what policy, planning, and management responses (i.e., adaptations) have been developed or are being considered by protected areas agencies and organizations across Canada. Understanding how protected areas agencies and organizations view climate change (both independent of and with respect to adaptation and mitigation) is an important precursor to any attempt at developing an adaptation strategy. The results of the survey build on recent protected areas and climate change work conducted in Canada by both scientists (e.g., Scott and Suffling 2000; Scott et al. 2002; Lemieux and Scott 2005; Scott and Lemieux 2005; Lemieux et al. 2008; Lemieux et al. 2010; Lemieux et al., 2011; Lemieux and Scott, in press) and practitioners (e.g., Henderson et al. 2002; Welch 2005; Vandall et al. 2006) and provide an important overview of the state of climate change adaptation in Canada's protected areas sector. The survey also establishes an indication of the current capacity (as self-evaluated) of agencies to respond to the climate change issue.

The state of climate change adaptation in Canada's protected areas sector: The Canadian protected areas and climate change survey

Adaptation involves making adjustments in decisions, activities, and thinking because of observed or expected changes in climate, in order to moderate harm or take advantage of new opportunities (IPCC 2007b). Adaptation is a necessary complement to the reduction of GHG emissions in addressing climate change (IPCC 2007b). Climate change adaptation planning in the protected areas sector is important for a number of reasons: (1) climate change is already impacting protected areas' ecosystems and resources (e.g., the distribution, phenology, and composition of species; landscape physiography; and the provision of recreational opportunities); (2) despite efforts to reduce GHG emissions, some level of human-induced change will be realized in the 21st century; (3) proactive adaptation will be more cost effective and efficient in reducing the potential for irreversible impacts, such as species extinctions, and in exploiting potential benefits than reactive responses (Smit et al. 1999; Burton et al. 2002; Root et al. 2003; Parmesan 2006; Stern 2006; Thomas et al. 2006; IPCC 2007a; Herrod and West 2008; Lemmen et al. 2008; Pearson and Burton 2009). Most importantly, protected areas agencies will need to be adaptive in order to deliver on their various protected areas- and biodiversity-related mandates, such as the perpetual protection of

representative elements of natural heritage (e.g., Government of Canada 2000; Government of Ontario 2007). Pielke (1998) and Vedwan and Rhoades (2001) stress that the way in which decision-makers perceive climate change is a significant factor influencing the climate adaptations that are actually adopted. Moreover, there is an urgent need identified in the literature for ongoing, rigorous "accounting" of climate change adaptation (Thompson et al. 2006). While Scott and Lemieux (2005) and others (e.g., Welch 2005; Baron et al. 2009; Heller and Zavaleta 2009; West et al. 2009; Lemieux et al. 2011) have produced climate change adaptation portfolios for protected areas based on syntheses of the scientific literature, these are potential adaptations and do not reflect what adaptation is occurring or planned in practice.

In response to these identified research needs in the field of climate change adaptation generally, but particularly in the protected areas and biodiversity conservation sectors, and with the endorsement of the North American Chapter of the International Union for Conservation of Nature's World Commission on Protected Areas, the University of Waterloo, and the Canadian Council on Ecological Areas (CCEA) initiated a collaborative protected areas and climate change survey to assess the state of current efforts on climate change adaptation employed by Canadian protected areas agencies and organizations.

Survey design, sampling method, and participants

The authors designed the survey instrument in consultation with the CCEA. The CCEA, which has complete federal, provincial, and territorial protected areas agency representation, was incorporated in 1982 as a national, not-for-profit organization with a mission "to facilitate and assist Canadians with the establishment and management of a comprehensive network of protected areas representative of Canada's terrestrial and aquatic ecological natural diversity" (CCEA n.d.). A central function of the CCEA is to mobilize experts and practitioners to advance work on subject areas and issues that are critical for designing, planning, and managing protected natural areas. Climate change has been recognized as an issue of high priority in the CCEA's current *Strategic Plan* (CCEA 2009). Its importance has been further highlighted by all Canadian protected areas jurisdictions participating in a recent CCEA northern protected areas survey (Wiersma et al. 2006). The survey was reviewed by an advisory committee that included jurisdictional representatives of the CCEA and researchers from the University of Waterloo. A pre-test was administered to four CCEA jurisdictional representatives to assess the clarity of the survey design, its appropriateness to the audience, and whether it achieved the aims of the research. Primarily closed-ended questions were used and grouped into sections of related questions. Questions were grouped by themes to ensure the flow and sequence of the survey was appropriate to the respondents' understanding of the research purpose and to maintain their willingness to provide meaningful responses. In total, 23 questions were asked of respondents and, depending on their responses, up to nine follow-up questions could be asked.

Survey participants were selected from government agencies and environmental nongovernmental organizations (ENGOs) that plan, establish, or manage protected areas in Canada. The survey sample (n = 35) was selected to represent the full spectrum of agencies and organizations operating at varying geographical and jurisdictional scales across Canada (Table

Federal Government (n = 4)
- Environment Canada, Canadian Wildlife Service*
- Parks Canada Agency*
- Canadian Heritage Rivers (of Parks Canada Agency)*
- Department of Fisheries and Oceans, Marine Protected Areas*

Provincial Government (n = 13)
- Government of Alberta, Alberta Community Development, Parks and Protected Areas*
- Government of British Columbia, British Columbia Ministry of Environment*
- Government of Manitoba, Manitoba Conservation*
- Government of New Brunswick, Department of Natural Resources*
- Government of Newfoundland and Labrador, Department of Environment and Conservation, Parks and Protected Areas Division*
- Government of Nova Scotia, Environment and Labour, Protected Areas Branch*
- Government of Nunavut, Department of Environment, Nunavut Parks and Special Places*
- Government of Ontario, Ontario Ministry of Natural Resources (MNR), Ontario Parks*
- Government of Prince Edward Island, Forests, Fish, and Wildlife Division, Department of Environment, Energy and Forestry*
- Gouvernement du Québec, Ministère du Développement durable de l'Environnement et des Parcs*
- Government of Saskatchewan, Saskatchewan Environment*
- Government of Yukon, Yukon Environment, Parks Branch*
- Government of Northwest Territories, Department of Industry, Tourism and Investment, Tourism and Parks Division*

Environmental Non-governmental Organizations (ENGOs) (n = 13)
- Canadian Boreal Initiative (CBI)
- Canadian Biosphere Reserves Association (CBRA)
- Clayoquot Biosphere Trust
- Deh Cho Land Use Plan
- Long Point Biosphere Reserve
- Nature Canada
- The Nature Conservancy of Canada (NCC)
- Wildlife Habitat Canada (WHC)
- World Wildlife Fund (WWF) Canada
- Carolinian Canada Coalition (CCC)
- Ontario Nature
- Yellowstone to Yukon (Y2Y)
- Canadian Parks and Wilderness Society (CPAWS)

Other (n = 5)
- Federation of Canadian Municipalities
- Conservation Ontario
- Toronto and Region Conservation Authority (TRCA)
- Credit Valley Conservation Authority (CVCA)
- Niagara Escarpment Commission (NEC)

*= CCEA affiliate agency

Table 1. Summary of respondents who participated in the Canadian protected areas and climate change survey.

1). Collectively, agencies included in the survey are responsible for at least 4,850 protected areas or about 99% of Canada's entire protected areas network both in terms of total number of protected areas and total hectares protected.

The survey pool included CCEA jurisdictional representatives working in principal federal departments (n = 4) and provincial/territorial ministries/departments (n = 13). In addition, a sample of other agencies that operate at smaller jurisdictional scales, such as municipalities and conservation authorities, were included (n = 5). First Nations and ENGOs that plan and establish protected areas independently or provide important research, capacity-building, and/or outreach functions within the Canadian protected areas community were also surveyed (n = 13). The survey was completed over a six-month period; follow-up communications continued until 100% of the pre-identified (purposive) sample had submitted their surveys on behalf of their respective agencies. A discussion of select survey results is presented below. The complete survey may be obtained by contacting the lead author.

Results and discussion

Perceptions of climate risk and vulnerability. When asked when the issue of climate change will be relevant to protected areas planning and management in their agency, all agencies and organizations considered climate change to be an important management issue for protected areas "now" (91%) or in the very near future (i.e., 2020s) (100%). Furthermore, 71% of the agencies surveyed either "strongly agreed" or "somewhat agreed" with the statement that "climate change will substantially alter protected areas policy and planning over the next 10 years." When asked the same question, but in the context of the next 25 years, virtually all respondents (94%) "strongly agreed" or "somewhat agreed" with the statement. Although climate change was identified as an issue affecting the management of protected areas now, respondents ranked a number of other management issues ahead of the impacts of climate change (Table 2). However, when asked the same question in the context of 25 years from now, 60% of the agencies ranked climate change as an issue of greater importance than currently perceived. Climate change ranked as the second most important management issue to protected areas agencies 25 years from now, ranking only behind external threats, and associated human land-use patterns.

With respect to the range of climate change impacts expected to occur within protected areas, respondents indicated that the most important impacts will be on watersheds (including wetlands, water quality, and quantity), wildlife, and vegetation, with 89% of the agencies identifying climate change impacts on these features as either "very important" or "important." Impacts of climate change on both policy and management for protected areas also ranked high, with 80% and 74% of respondents identifying impacts on these functions as either "very important" or "important," respectively. Conversely, respondents took the position that the least important climate change-related impacts on protected areas will be those associated with revenues (with over a quarter assessing this issue to be "unimportant" and 31% assessing it to be "slightly important"), operations and development (i.e., infrastructure), and interpretation programs (with 37% of agencies assessing these issues to be "unimportant" or "slightly important").

Perceived Importance				Management Issue
Now		Future		
Rank	Median	Rank	Median	
1	3	1 (n/c)	2	External Threats (e.g., surrounding land-use, habitat fragmentation)
10	**8**	**T-2 (+8)**	**4**	**Climate Change**
2	3.5	T-2 (n/c)	4	Human Land-use Patterns (e.g., roads, population density)
T-4	5	T-4 (n/c)	5	Wildlife Management (e.g., species richness, population dynamics, trophic structure)
3	4.5	T-4 (-1)	5	Rare/Endangered Species Management
T-4	5	T-6 (-2)	6	Water Quality/Air Quality
7	6	T-6 (+1)	6	Exotic Species (e.g., animal and plant)
T-8	7	8 (n/c)	7	Disturbance Frequencies (e.g., fire, insects, floods)
T-4	5	T-9 (-5)	8	Visitor Stresses (e.g., public facilities, interpretation centres)
T-8	7	T-9 (-1)	8	Contamination/Pollution

T= tie in ranking; value in parentheses indicates increase/decline in ranking
n/c = no change in ranking

Table 2. Current and future perceived importance of climate change relative to other protected areas management issues by Canadian protected areas agencies (based on median of rankings, 1–10, by respondents).

Climate change impacts, adaptation, and information needs. A clear majority (73%) of respondents indicated that protected areas within their agency's jurisdiction were currently affected by climate change-related impacts. For example, respondents for all provincial/territorial jurisdictions and all federal departments indicated that at least one climate change-related impact was occurring within their protected areas. The remaining respondents (27%) indicated that they were "not sure" whether or not protected areas within their jurisdiction were experiencing climate change-related impacts.

Figure 2 illustrates the range of climate change-related impacts reported to be occurring within Canada's protected areas network. Species range shifts and changes in physiography (e.g., shoreline erosion and glacial retreat) were the most common climate change-related impacts reported within Canada's protected areas, with 75% of respondents reporting such impacts. Changes in species composition (i.e., the character of the vegetation within a protected area) and changes in disturbance regimes (e.g., forest fire frequency and pest/disease outbreaks) were also reported to be occurring within protected areas by nearly half of the respondents (41%). Examples of "other" reported climate change impacts included sea level rise within migratory bird sanctuaries (MBSs) and national wildlife areas (NWAs) managed

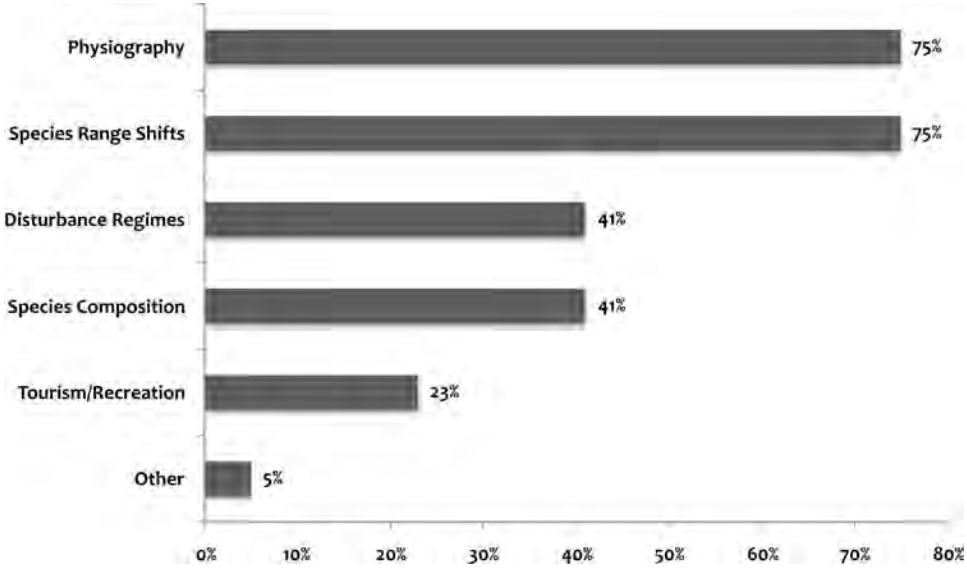


Figure 2. The range of climate change-related impacts reported to be occurring within Canada's protected areas network (percent of respondents reporting impact type and related impacts, e.g., on tourism/recreation).

by Environment Canada. Over the past century, sea level has risen approximately 32 cm in the Atlantic region (Parks 2006, 20), 4 cm in Vancouver, 8 cm in Victoria, and 12 cm in Prince Rupert, British Columbia (British Columbia Ministry of Water, Land and Air Protection 2002, 30). (The increases in sea level noted here have been attributed to climate change. The differences in sea level rise between Pacific and Atlantic oceans are primarily due to eustatic change.)

Despite agency perceptions of the importance of climate change over the next 25 years, and a range of climate change impacts reportedly already occurring within Canadian protected areas, the majority of respondents (83%) indicated that their agency had not completed a comprehensive assessment of the potential impacts and implications of climate change for their respective policy, planning, and management functions. This suggests that jurisdictional and agency-specific climate change impacts and implications for protected areas remain largely unknown in Canada. Ontario (Lemieux et al. 2007; Lemieux et al. 2008), Saskatchewan (Henderson et al. 2002; Vandall et al. 2006), and New Brunswick are the only provinces or territories known to have undertaken a climate change vulnerability assessment of protected areas and, with the exception of the World Wildlife Fund (WWF 2003), none of the other 12 ENGOs documented in the survey have completed such an assessment. Parks Canada Agency is the only federal department to have completed a climate change scoping report (Scott and Suffling 2000) and was one of the first internationally to do so.

No assessments have been completed for species-at-risk or for MBSs and NWAs, which include 144 sites protecting over 14 million ha, equating to nearly half of the total area protected by Parks Canada Agency (Environment Canada 2006). The lack of applied research on climate change and species at risk in Canada is of particular concern. Species currently

classified as "at risk" may be among the most vulnerable to climate change and least capable of adapting naturally given their typically small populations, limited habitat, and exposure to external stressors. Clearly, there is a need for greater research and monitoring of climate change and consideration of the implications for species-at-risk management and policy. For example, Canada's Species at Risk Act (SARA) does not explicitly address the issue of climate change. Furthermore, limitations exist in SARA's time-sensitive definition of wildlife species eligible for protection in Canada (i.e., a species "native" to Canada or that has been present in Canada for at least 50 years) (Government of Canada 2003) and in the interpretation of SARA's mandates in the context of anthropogenically driven climate change. Despite these important implications, there has been inadequate attention, both in terms of monitoring and research, paid to climate change and species at risk within Environment Canada.

These findings reflect the limited scientific information available to protected areas agencies and the scarcity of resources that agencies have to devote to the climate change issue (see further discussion below). Generally speaking, agencies did not want more information on issues associated with atmospheric processes and climate modeling or on errors in and challenges with modeling the climate system (Table 3). Agencies expressed interest in information about the ecological consequences of climate change (all agencies and organizations noted that they would like more information on the issue) and the implications of climate

Table 3. Types of additional information Canadian protected natural areas agencies would like to have on various climate change-related issues (by percent of total number of responses).

Research Theme	Much More Information	Some More Information	No More Information
Information on climate or atmospheric processes	12%	59%	29%
Errors and problems in computer modeling of the climate system	6%	50%	44%
Detecting climate change (e.g., temperature trends)	29%	44%	27%
Ecological consequences of climate change	79%	21%	0%
Impacts of climate change on physiography	41%	50%	9%
Impacts of climate change on visitation (tourism and recreation)	35%	41%	24%
Implications of climate change for planning, policy, and management	56%	38%	6%
Strategies for climate change adaptation	71%	23%	6%
Strategies for effective communication of climate change issues	50%	44%	6%

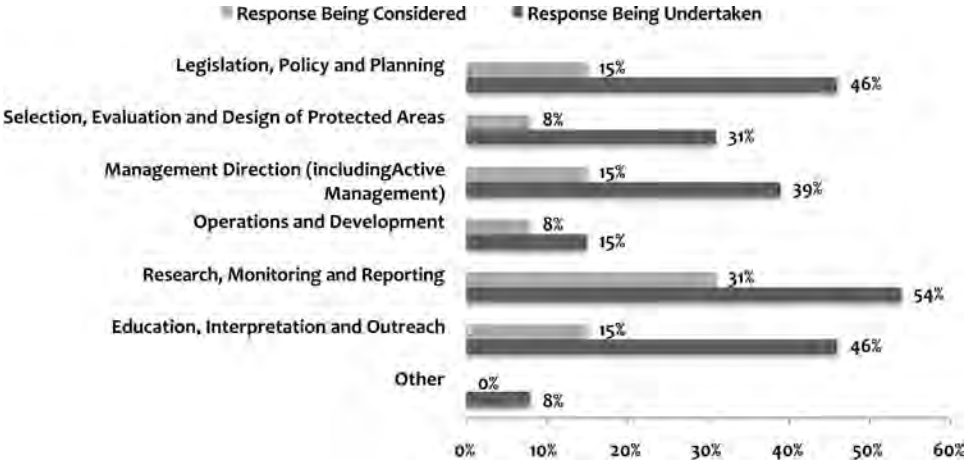


Figure 3. Climate change responses being undertaken or being considered by Canadian protected areas agencies (by major program area; percentages have been rounded).

change for policy, planning, and management strategies (with 94% of agencies noting that they would like more information on the issue). A large majority (94%) of the respondents indicated that they wanted more information on strategies both for managerial responses (adaptation) to climate change impacts and strategies for effective communication of climate change issues. Although research interest in climate change communication and protected areas has increased in recent years (e.g., Schweizer et al. 2009), the research community has yet to evaluate how the revolution in climate information and information communication has enhanced visitor understanding of climate change impacts and how this information has translated into improved decision-making within agencies (Scott et al. 2011).

Of all respondents, only Parks Canada Agency, Ontario Parks, Government of Saskatchewan, Government of British Columbia, and WWF Canada acknowledged having a budget allocated specifically to respond to the challenges of climate change. Moreover, nearly half of the agencies surveyed (46%) noted that they do not have an individual within their agency responsible for climate change-related issues (including legislation, policy, research, planning, management, and research and monitoring) and, for the agencies that do, climate change was perceived to be more of a future issue and not a current priority.

As Figure 3 illustrates, little action is currently being undertaken or considered by most protected areas agencies to deal with climate change-related issues. Moreover, despite the important role that protected areas could play in climate change detection, monitoring, and research, and in facilitating species adaptation, only half of the agencies reported that the magnitude and extent of climate change-related impacts in their protected areas are being investigated. While 97% of the agencies surveyed "strongly agreed" or "somewhat agreed" with the statement that "climate change detecting and monitoring should be a priority for protected areas agencies," less than a third (31%) reported that they specifically monitor for climate change impacts. For example, Parks Canada Agency recently launched a monitoring program to measure, assess, and report on indicators of ecological integrity in national parks, including the effects of climate change. As a distributed monitoring network based in terres-

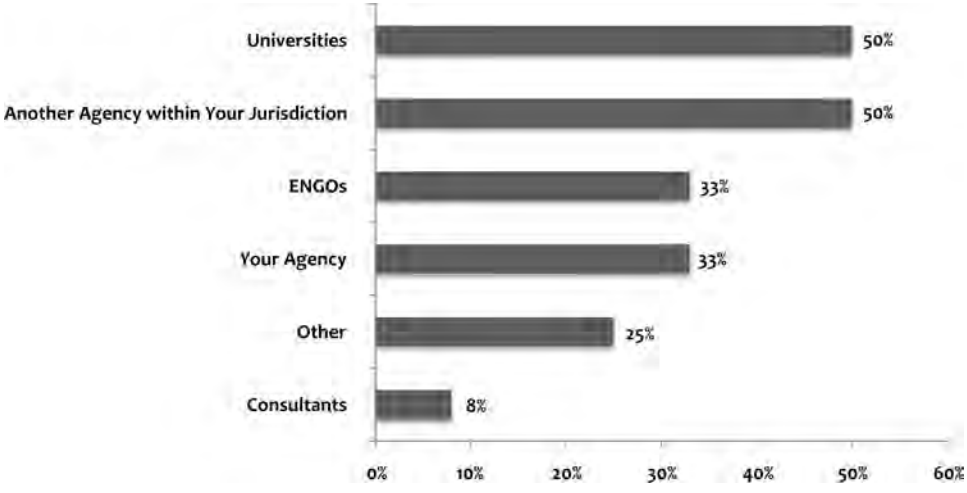


Figure 4. Climate change-related research being conducted in Canada's protected areas by "researcher type" (respondents could select more than one category; percentages have been rounded).

trial and marine protected areas, Parks Canada Agency's ecological monitoring program will form the basis for understanding impacts of climate change on the broader land and seascape, informing land-use planning, marine planning, environmental assessment, and other processes important for sustainable development (Keenleyside 2010).

Five agencies and organizations (14%) have developed indicators for the long-term monitoring of climate change, although the extent of monitoring activities appears to be limited to solitary impacts, such as glacial retreat or single-species monitoring. Of the agencies involved in climate change research, much of the work has been conducted outside of their usual research and monitoring programs by various "researcher types" (Figure 4). Agency–university partnerships in research appear to be particularly important in broadening scientific understanding of climate change and associated impacts in parks and other forms of protected areas in Canada.

Finally, despite the leading role that protected areas could play in educating the public about climate change, demonstrating its impacts and providing examples of adaptation, only six agencies (17%) have incorporated climate change into public education, interpretation, and outreach programs. Importantly, however, a number of agencies, including Parks Canada Agency and Ontario Parks, have included climate change information on their websites and interactive posters aimed at youth, and some have begun incorporating climate change into park interpretation programs (see e.g., Parks Canada Agency 2010).

Adaptive capacity of Canada's protected areas sector. Despite the limited response to date on climate change, Canadian protected areas agencies expressed a strong desire to advance the climate change adaptation agenda. Over two-thirds of the agencies (69%) "strongly disagreed" or "somewhat disagreed" with the statement that "there are too many uncertainties regarding climate change to develop adaptation strategies for protected areas" and nearly two-thirds indicated that formal climate change discussions have taken place within their agency. Most of these discussions have occurred through various awareness- and

- "Priorities are not focused on climate change—lack of staff and financial resources for dealing with climate change are the main capacity issues."
- "Only one person is focusing on climate change issues and is self-appointed."
- "No staff, no financial resources, knowledgeable/scientifically trained staff to deal with the climate change issue."
- "We are under-sourced with no research/knowledge base and have difficulties meeting our current program needs."
- "We don't have confidence in science's ability in this instance to predict in a suitable time frame what issues will emerge; therefore, issues will likely have to be addressed as they emerge.... Climate change is inevitable but there is not much you can hang your hat on in terms of ecosystem and species responses."
- "More human and financial resources are needed to address arising issues and questions."
- "We haven't had the resources to even investigate what climate change could mean to our protected areas system but assume expansion is a way to mitigate, so that is where our focus is right now."

Table 4. Respondent feedback on capacity issues related to climate change and protected areas adaptation.

capacity-building initiatives, including workshops and other expert meetings. Nevertheless, protected areas agencies appear uncertain about how to proceed: 91% of the agencies conceded that they currently do not have the capacity necessary to respond effectively to climate change. Common reasons included lack of staff and financial resources and inadequate internal scientific capacity to deal with climate change (verbatim examples of the reasons cited in the survey are quoted in Table 4, maintaining respondent anonymity in accordance with University of Waterloo Office of Research Ethics guidelines). It comes as little surprise, therefore, that 83% of the agencies surveyed do not have a climate change policy or adaptation strategy specifically pertaining to protected areas or biodiversity conservation, or a climate change mitigation strategy (i.e., in-house plan to reduce GHG emissions). Moreover, of the 29 agencies currently without a climate change policy or adaptation strategy directly related to protected areas, only four (11%) stated they were currently in the process of developing one.

Moving forward on climate change adaptation in Canada's protected areas

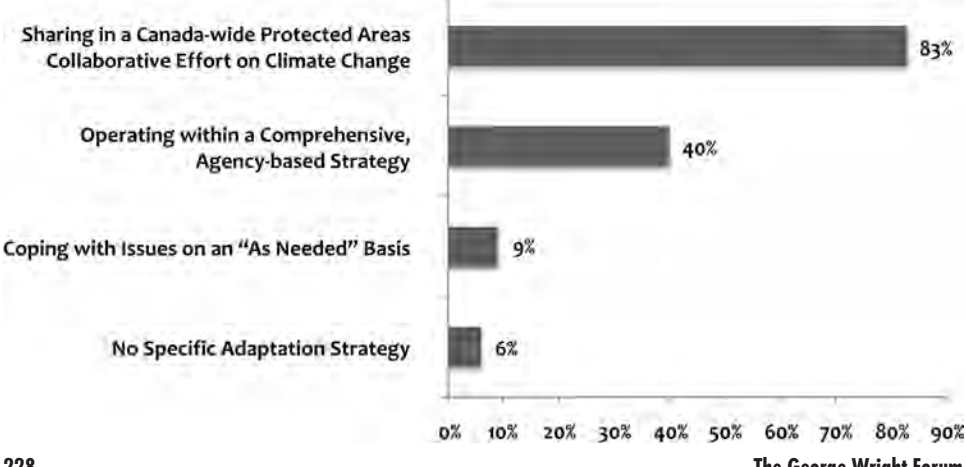
It has been estimated that species are currently in the "first order" of ecological response to modern climate change (i.e., adjusting phenotypes and geographic ranges; Barnosky et al. 2003). However, a growing number of researchers contend that the rapid loss of climate envelopes in which species and ecosystems have adapted over the past several interglacial periods would result in widespread turnover and extinctions (see Thomas et al. 2004; Malcolm et al. 2006; IPCC 2007a; Lawler et al. 2009, among others). The scientific literature on climate change adaptation overwhelmingly suggests that adapting now (i.e., mainstreaming climate change into policy, planning, and management program functions) will be more effective than adapting later; i.e., doing so will be more cost effective and efficient in reducing the potential for irreversible impacts, such as species extinction (e.g., Smit et al. 1999;

Burton et al. 2002; Stern 2006; Pearson and Burton 2009). Overall, however, a significant gap remains between the perceived importance of climate change and the capacity (i.e., funding, staff expertise, etc.) of protected areas agencies and organizations to respond to the challenges of rapid climate change. Capacity constraints at the provincial, territorial, and federal levels appear to be similar: all but one province stated that they did not have the capacity to respond to climate change. This was rather alarming considering that the provinces and territories are responsible for over 95% of Canada's protected areas (in terms of total number of sites).

There is an evident lack of strategic response in the policy, system planning, and management program areas of various jurisdictions. No strategy (or action plan) specific to any protected areas agency has been developed to help with guiding decision-making at the regional or park levels. This lack of response in most of the policy, planning, and management functions gives the impression that many jurisdictions may be unprepared to deal effectively with the more widespread and complex impacts that are anticipated as the climate continues to change throughout the 21st century. Moreover, only about one-half of the agencies participating in the survey are actively involved in climate change dialogue and capacity-building initiatives (e.g., staff participation in workshops and conferences and staff training, etc.), which suggests that adaptive capacity will remain low for the foreseeable future. The large turnover and loss of staff that has been common to protected areas agencies over the past decade (e.g., ECO 2007; CPAWS 2008) further challenges the maintenance of adequate internal expertise and experience with climate change adaptation.

Given the multi-scale and cross-jurisdictional nature of climate change impacts, independent top-down approaches will not suffice in the long-term. A more integrated and collaborative approach within Canada and on a continental scale will be needed if protected areas agencies are to address the climate change issue effectively. Nearly all protected areas agencies participating in the survey (86%) noted that they would be willing to participate in

Figure 5. Selected preferences from among suggested approaches to climate change adaptation (percent of protected areas agencies respondents; respondents could select more than one option).



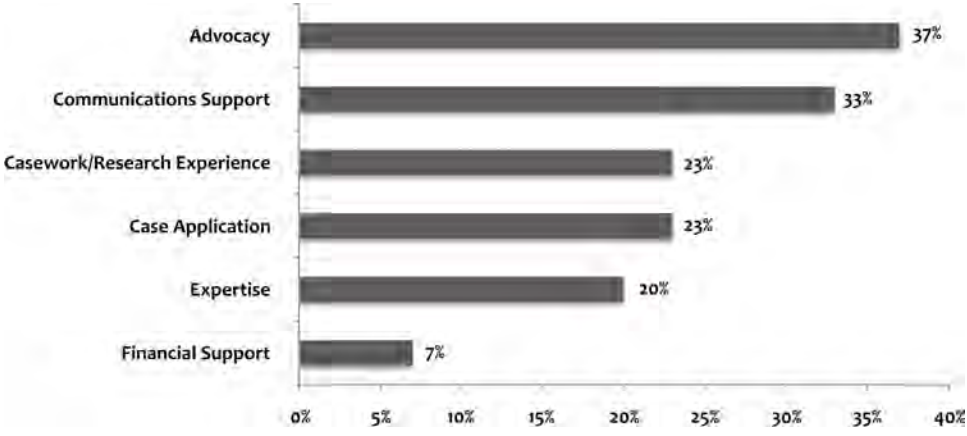


Figure 6. Resources that protected areas agencies would be willing to provide for a climate change and protected areas working group or a nationwide conference on the topic (respondents could select more than one option).

either a nationwide working group or conference on climate change and protected areas. Furthermore, 83% held the position that a nationwide collaborative effort on climate change would be a suitable approach to adaptation (Figure 5).

For climate change adaptation to be effective, it must go hand-in-hand with good communication about climate change, its impacts, and associated agency management responses (Schweizer et al. 2009). Fortunately, there appears to be some capacity to communicate climate change messages to staff, members of specific associations and groups, and to the general public. One-third of respondents (33%) indicated that they would be prepared to provide advocacy and communications support to a national working group or national workshop (Figure 6). On the other hand, few agencies are in a position to provide financial resources (7%) or human assets (i.e., scientific expertise) (20%).

Conclusions

Climate change is not a remote future event for biodiversity and protected areas planning and management. The varied impacts of a changing climate are becoming more and more evident at locations around the world, including Canada (IPCC 2007a; Lemmen et al. 2008). Parry et al. (2009) and others previously (e.g., Stehr and von Storch 2005) have stressed that the risks and dangers of failing mitigation efforts (i.e., reductions in GHG emissions) without adaptive strategies would have serious implications for society and that to ignore adaptation would be similarly perilous for nature. Several recent studies have indicated that with current government commitments to GHG emission reductions, temperatures would exceed 2°C of average global warming by 2100 (Hansen et al. 2007; Anderson and Bows 2008; Meinshausen et al. 2009; Parry et al. 2009; Rogelj et al. 2009). This level of warming would exceed the thresholds identified by the IPCC wherein 20–30% of Earth's plant and animal species will likely be at increased risk of extinction (IPCC 2007b, 48).

Although there is much uncertainty about the timing, extent, and manner in which

ecosystems and other protected areas assets (e.g., recreational opportunities) might respond to evolving climatic conditions, it is critically important that natural asset management agencies begin to identify, assess, and implement adaptation options that could reduce the vulnerability of Canada's protected areas (and their constituent biodiversity) to climate change. The *Report of the Commissioner of the Environment and Sustainable Development* emphasized that failing to invest adequately in the area of climate change adaptation will "undermine Canada's ability to make wise decisions" (Gelinas 2006, 20). The report also called on all governments to begin developing action plans that cut across departments, to work with other levels of government to develop clear priorities, and to find new ways to connect researchers with decision-makers (Gelinas 2006).

Canada, a world leader in the protected areas movement, has made some progress in recognizing and documenting the threats and opportunities associated with climate change, with work initiated in some agencies that begins dealing with the issue (e.g., Scott and Suffling 2000; Scott et al. 2002; Lemieux and Scott 2005; Scott and Lemieux 2005, 2007; Welch 2005; Jones and Scott 2006a, 2006b; Lemieux et al. 2010, 2011; Lemieux and Scott, in press). With limited resources at their disposal, it is encouraging that many protected areas agencies have progressed as much as they have on climate change adaptation. However, adaptation within Canada's protected areas jurisdictions is occurring independently, without national coordination, and there continues to be a relatively slow response by practitioners both in terms of the development and implementation of relevant policy and management strategies.

Why has there been so little practical climate change adaptation within the protected areas sector? First, the extant scientific literature on the subject has been dominated by ecology and has failed to integrate social science considerations, including decision-making and other management objectives of protected areas (Lemieux and Scott 2005; Welch 2005; Heller and Zavaleta 2009; Lemieux et al. 2010). Second, the high degree of uncertainty in assessments of climate change impacts can make it difficult for a manager to translate results from climate change assessments into practical management decisions (Dessai et al. 2009; Lawler et al. 2009; Lemieux et al. 2011). Third, the protected areas and climate change adaptation literature has been described as too generic with relatively little direct investigation into the desirability and feasibility of adaptation options by those actually responsible for the planning and management of protected areas (Scott and Lemieux 2005). As Welch (2005) emphasized, the limited climate change literature on protected areas provides little guidance to protected area managers. Finally, the results of our survey reveal an overriding need for more resources to build capacity for effective management within protected areas institutions. Such findings are consistent with other natural resource sectors in Canada (e.g., forestry) that have also experienced challenges in their efforts to mainstream climate change into policy, planning, and management frameworks (e.g., Ogden and Innes 2009).

While constraints such as limited financial resources, limited capacity, and lack of understanding of real or anticipated climate change impacts need to be eliminated, an immediate concern for protected areas agencies is the further strengthening and development of relational networks at all scales. The survey results show that climate change education, capacity-building, and information dissemination has largely occurred through external con-

ferences (i.e., piggy-backing) rather than through formally established networks. Recognizing complementary strengths and weaknesses between and among agencies will be critical in any collaborative effort to address climate change.

Collaboration could be enhanced through the establishment of professional networks both within Canada and on a continental scale between Canada, the United States, and Mexico. Protected areas will remain the fundamental building blocks of national and international conservation strategies and their role in safeguarding biodiversity will become even more critical in an era characterized by rapid climate change. It is to be hoped that extreme events, such as species extinctions, are not required to raise public and practitioner awareness of climate change in order to motivate proactive conservation action. Ultimately, the results presented here reveal that inadequate investment in climate change adaptation may lead protected area managers to maintain the status quo or rely on reactive adaptation (vs. proactive adaptation) despite concerns about the long-term viability of current planning and management practices. Considering the short-term projections of species turnover and loss resulting from climate change, the potential for non-linear ecological responses (in other words, ecological surprises), the length of time required for species and ecosystem response to management interventions, and the relatively slow process of implementing new policies within protected areas agencies, the time to begin developing proactive, and integrative climate change adaptation strategies is now.

Acknowledgments

This report is a product of the cooperative effort of many individuals within the Canadian protected areas community. The authors would like to express sincere gratitude to all those who participated in the Canadian Council on Ecological Areas (CCEA) protected areas and climate change survey—without your participation and input this research would have not been possible. Please know that your tremendous contributions are greatly appreciated by the authors. The CCEA board, directors, and jurisdictional representatives of CCEA provided valuable support throughout the project. Review comments provided by Jill S. Baron (US Geological Survey, Colorado State University), and two anonymous reviewers helped improve the article. This article would have not been possible without funding provided by CCEA, the Social Sciences and Humanities Research Council of Canada, and Fulbright Canada. Finally, we thank Stephen D. Murphy (Centre for Applied Sciences in Ontario Protected Areas, University of Waterloo), Christopher J. Kirkey and staff (Center for the Study of Canada, State University of New York–Plattsburgh), Jill S. Baron, and David Harmon (World Commission on Protected Areas–North America and George Wright Society) for providing valuable in-kind support.

[Ed. note: This article originally appeared in *The Canadian Geographer / Le Géographe canadien* 33, no. 3; doi: 10.1111/j.1541-0064.2010.00336.x, 2011.

References

Anderson, K., and A. Bows. 2008. Reframing the climate change challenge in light of post-2000 emission trends. *Philosophical Transactions of the Royal Society A* 366 (1882): 3863–3882; doi: 10.1098/rsta.2008.0138.

Barnosky, A.D., E.A. Hadly, and C.J. Bell. 2003. Mammalian response to global warming on varied temporal scales. *Journal of Mammalogy* 84 (2): 354–368.

Baron, J.S., L. Gunderson, C.D. Allen, E. Fleishman, D. Mckenzie, L.A. Meyerson, J. Oropeza, and N. Stephenson. 2009. Options for national parks and reserves for adapting to climate change. *Environmental Management* 44 (6): 1033–1042; doi: 10.1007/s00267-009-9296-6.

British Columbia Ministry of Water, Land and Air Protection. 2002. *Indicators of Climate Change for British Columbia*. Victoria, BC: British Columbia Ministry of Water, Land and Air Protection. Online at http://www.env.gov.bc.ca/cas/pdfs/indcc.pdf.

Burton, I., S. Huq, B. Lim, O. Pilifosova, and E.L. Schipper. 2002. From impacts assessment to adaptation priorities: the shaping of adaptation policies. *Climate Policy* 2: 145–159; doi: 10.3763/cpol.2002.0217.

CBD [Convention on Biological Diversity]. 1992. *Convention on Biological Diversity*. Nairobi: United Nations Environment Programme. Online at http://www.cbd.int/doc/legal/cbd-un-en.pdf.

———. 2009. *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. CBD Technical Series no. 41. Montreal, QC: Secretariat of the CBD. Online at http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf.

CCEA [Canadian Council on Ecological Areas]. 2009. *Strategic Plan 2010–2020*. Gatineau, QC: CCEA Secretariat, Environment Canada.

———. 2010. *Conservation Areas Reporting and Tracking System (CARTS)*. Online at http://ccea.org/en carts.html.

———. n.d. Mission statement. Online at http://www.ccea.org/ en mission.html.

CCME [Canadian Council of Ministers of the Environment]. 2003. *Climate, Nature, People: Indicators of Canada's Changing Climate*. Winnipeg, MB: CCME. Online at http://www.ccme.ca/assets/pdf/cc_ind_full_doc_e.pdf .

CPAWS [Canadian Parks and Wilderness Society]. 2008. *The State of Alberta's Parks and Protected Areas Report*. Edmonton, AB: CPAWS. Online at http://www.cpawsnab.org/factsheets/report_summary_for_online_distribution.pdf

Dessai, S., M. Hulme, and R. Lempert. 2009. Do we need better predictions to adapt to a changing climate? *Eos* 90 (13): 111–112.

ECO [Environmental Commissioner of Ontario]. 2007. *Doing Less with Less: How Shortfalls in Budget, Staffing and Inhouse Expertise are Hampering the Effectiveness of MOE and MNR*. Special report to the Legislative Assembly of Ontario. Toronto: ECO.

Environment Canada. 2006. *Canadian Protected Areas Status Report, 2000–2005*. Gatineau, QC: Environment Canada. Online at http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=5A5F8028-B497-4441-92DE-4015F1E4F5D1.

Gelinas, J. 2006. *Report of the Commissioner of the Environment and Sustainable Develop-*

ment to the House of Commons. Ottawa, ON: Office of the Auditor General of Canada.
Government of Canada. 2000. *Canada National Parks Act 2000, c. 32*. Ottawa, ON: Government of Canada. Online at http://www.pc.gc.ca/docs/bib-lib/~/media/docs/bib-lib/pdfs/acts/cnpa_e.ashx.
———. 2003. *Canadian Species at Risk Act.* Chapter 29. Ottawa, ON: Government of Canada.
———. 2009. *Canada's Fourth National Report to the Convention on Biological Diversity*. Ottawa, ON: Government of Canada.
Government of Ontario. 2007. *Ontario Provincial Parks and Conservation Reserves Act 2006*, Chapter 12. Online at http://www.elaws.gov.on.ca/html/statutes/english/elaws-statutes 06p12e.htm.
Hamann, A., and T. Wang. 2005. *Potential Effects of Climate Change on Ecosystem and Tree Species Distribution in British Columbia*. Vancouver, BC: Centre for Forest Gene Conservation, Department of Forest Sciences, University of British Columbia.
Hannah, L., G. Midgley, and D. Millar. 2002. Climate change-integrated conservation strategies. *Global Ecology and Biogeography* 11: 485–495.
Hansen, J., et al. 2007. Dangerous human-made interference with climate: A GISS model study. *Atmospheric Chemistry and Physics* 7: 2287– 2312; doi: 10.5194/acp-7-2287-2007.
Heller, N., and E. Zavaleta. 2009. Biodiversity management in the face of climate change: A review of 22 years of recommendations. *Biological Conservation* 142: 14–32; doi: 10.1016/j.biocon.2008.10.006.
Henderson, N., E. Hogg, E. Barrow, and B. Dolter. 2002. *Climate Change Impacts on the Island Forests of the Great Plains and the Implications for Nature Conservation Policy: The Outlook for Sweet Grass Hills (Montana), Cypress Hills (Alberta–Saskatchewan), Moose Mountain (Saskatchewan), Spruce Woods (Manitoba–North Dakota)*. Regina, SK: Prairie Adaptation Research Collaborative.
Herrod, J.S., and J.M. West, eds. 2008. *Preliminary Review of Adaptation Options for Climate-sensitive Ecosystems and Resources: Final Report*. Washington, DC: US Climate Change Science Program.
IPCC [Intergovernmental Panel on Climate Change]. 2007a. *Climate Change 2007: Climate Change Impacts, Adaptation, and Vulnerability—Summary for Policymakers*. Working Group II Contribution to the IPCC Fourth Assessment Report. Cambridge, UK: Cambridge University Press.
———. 2007b. *Climate Change 2007: The Physical Science Basis*. Working Group I Contribution to the IPCC Fourth Assessment Report. Cambridge, UK: Cambridge University Press.
Jones, B., and D.J. Scott. 2006a. Climate change, seasonality and visitation to Canada's national parks. *Journal of Parks and Recreation Administration* 24 (2): 42–62.
———. 2006b. Implications of climate change for visitation to Ontario's provincial parks. *Leisure* 30 (1): 233–261.
Keenleyside, K. 2010. Personal communication with senior science and policy advisor, Parks Canada, Ecological Integrity Branch. March.

Lawler, J.J., S.L. Shafer, D. White, P. Kareiva, E.P. Maurer, A.R. Blaustein, and P.J. Bartlein. 2009. Projected climate-induced faunal change in the Western Hemisphere. *Ecology* 90 (3): 588–597; doi: 10.1890/08-0823.1.

Lemieux, C.J., T.J. Beechey, D.J. Scott, and P.A. Gray. 2010. *Protected Areas and Climate Change in Canada: Challenges and Opportunities for Adaptation*. CCEA Occasional Paper no. 19. Ottawa, ON: CCEA Secretariat.

Lemieux, C.J., and D.J. Scott. 2005. Climate change, biodiversity conservation and protected area planning in Canada. *The Canadian Geographer* 49 (4): 384–399; doi: 10.1111/j.0008-3658.2005.00103.x.

Lemieux, C.J., D.J. Scott, P.A. Gray, and R.G. Davis. 2007. *Climate Change and Ontario's Provincial Parks: Towards an Adaptation Strategy*. Climate Change Research Report no. CCRR-06. Sault Ste. Marie, ON: Ontario Ministry of Natural Resources.

Lemieux, C.J., D.J. Scott, R.G. Davis, and P.A. Gray. 2008. *Changing Climate, Challenging Choices: Ontario Parks and Climate Change Adaptation*. Ottawa, ON: Natural Resources Canada, Climate Change Impacts and Adaptation Program. Online at http://www.environment.uwaterloo.ca/geography/faculty/danielscott/PDFFiles/NRCAN-Report-FINAL.pdf.

Lemieux, C.J. and D.J. Scott. In press. Changing climate, challenging choices: identifying and evaluating climate change adaptation options for protected area management in Ontario, Canada. *Environmental Management;* doi: 10.1007/s00267-011-9700-x.

Lemmen, D.S., F.J. Warren, J. Lacroix, and E. Bush, eds. 2008. *From Impacts to Adaptation: Canada in a Changing Climate 2007*. Ottawa, ON: Government of Canada.

Malcolm, J.R., L. Canran, R.P. Neilson, L. Hansen, and L. Hannah. 2006. Global warming and extinctions of endemic species from biodiversity hotspots. *Conservation Biology* 20 (2): 538–548; doi: 10.1111/j.1523-1739.2006.00364.x.

Malcolm, J.R., C. Liu, L.B. Miller, T. Allnutt, and L. Hansen. 2002. *Habitats at Risk: Global Warming and Species Loss in Globally Significant Terrestrial Ecosystems*. Gland, Switzerland: Worldwide Wildlife Fund.

Malcolm, J.R., A. Markham, R.P. Neilson, and M. Garaci. 2002. Estimated migration rates under scenarios of global climate change. *Journal of Biogeography* 29: 835–849; doi: 10.1046/j.1365-2699.2002.00702.x.

Mckenney, D.W., J.H. Pedlar, K. Lawrence, K. Campbell, and M.F. Hutchinson. 2007a. Potential impacts of climate change on the distribution of North American trees. *BioScience* 57 (11): 939–948; doi: 10.1641/B571106.

———. 2007b. Beyond traditional hardiness zones: Using climate envelopes to map plant range limits. *BioScience* 57 (11): 929–937; doi: 10.1641/B571105.

Meinshausen, M., N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, D.J. Frame, and M.R. Allen. 2009. Greenhouse-gas emission targets for limiting global warming to 2°C. *Nature* 458 (7242): 1158–1162; doi: 10.1038/nature08017.

Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Biodiversity Synthesis*. Washington, DC: World Resources Institute.

Ogden, A.E., and J.L. Innes. 2009. Application of structured decision making to an assessment of climate change vulnerabilities and adaptation options for sustainable forest

management. *Ecology and Society* 14 (1): 11.

Opdam, P., and D. Wascher. 2004. Climate change meets habitat fragmentation: linking landscape and biogeographical scale levels in research and conservation. *Biological Conservation* 117: 285–297; doi: 10.1016/j.biocon.2003.12.008.

Parks, J.J. 2006. *Climate Change Adaptations for Land Use Planners*. Report submitted to Natural Resources Canada, Climate Change Impacts and Adaptation Program. Online at http://adaptation.nrcan.gc.ca/projdb/pdf/178b_e.pdf.

Parks Canada Agency. 2010. *The Climate is Changing in Our National Parks*. Ottawa, ON: Parks Canada Agency. Online at http://www.pc.gc.ca/docs/v-g/ie-ei/cc/index.aspx.

Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. *Annual Review of Ecology, Evolution, and Systematics* 37: 637–669.

Parry, M., J. Lowe, and C. Hanson. 2009. Overshoot, adapt, and recover. *Nature* 458: 1102–1103; doi: 10.1038/4581102a.

Pearson, D., and I. Burton. 2009. *Adapting to Climate Change in Ontario: Towards the Design and Implementation of a Strategy and Action Plan*. The Expert Panel on Climate Change Adaptation Report to the Minister of the Environment. Toronto: Queen's Printer for Ontario.

Pielke, R.A. 1998. Rethinking the role of adaptation in climate policy. *Global Environmental Change* 8 (2): 159–170; doi: 10.1016/S0959-3780(98)00011-9.

Pounds, J.A., and R. Puschendorf. 2004. Clouded futures. *Nature* 427: 107–109.

Rogelj, J., B. Hare, J. Nabel, K. Macey, M. Schaeffer, K. Markmann, and M. Meinshausen. 2009. Halfway to Copenhagen, no way to 2°C. *Nature Reports Climate Change* (June): 81– 83; doi: 10.1038/climate.2009.57.

Root, T.L., J.T. Price, K.R. Hall, S.H. Schneider, C. Rosenzweig, and J.A. Pounds. 2003. Fingerprints of global warming on wild animals and plants. *Nature* 421: 57–60; doi: 10.1038/nature01333.

Schweizer, S., J.L. Thompson, T. Teel, and B. Bruyere. 2009. Strategies for communicating about climate change impacts on public lands. *Science Communication* 31 (2): 266–274; doi: 10.1177/1075547009352971.

Scott, D.J., and C.J. Lemieux. 2005. Climate change and protected area policy and planning in Canada. *The Forestry Chronicle* 81 (5): 696–702. Online at http://nofc.cfs.nrcan.gc.ca/bookstore pdfs/25752.pdf.

Scott, D.J., and C.J. Lemieux. 2007. Climate change and protected areas policy, planning and management in Canada's boreal forest. *The Forestry Chronicle* 83 (3): 347–357.

Scott, D.J., C.J. Lemieux, and L. Malone. 2011. Climate services to support sustainable tourism and adaptation to climate change. *Climate Research;* doi: 10.3354/cr00952.

Scott, D.J., J.R. Malcolm, and C.J. Lemieux. 2002. Climate change and modeled biome representation in Canada's national park system: Implications for system planning and park mandates. *Global Ecology and Biogeography* 11: 475–484.

Scott, D.J., and R. Suffling. 2000. *Climate Change and Canada's National Parks*. Toronto: Environment Canada.

Smit, B., I. Burton, R.J.T. Klein, and R. Street. 1999. The science of adaptation: A framework for assessment. *Mitigation and Adaptation Strategies for Global Change* 4: 199–

213; doi: 10.1023/A:1009652531101.
Stehr, N., and H. Von Storch. 2005. Introduction to papers on mitigation and adaptation strategies for climate change: Protecting nature from society or protecting society from nature?. *Environmental Science and Policy* 8: 537–540; doi: 10.1016/j.envsci.2005.08.001.
Stern, N. 2006. *The Economics of Climate Change: The Stern Review*. Cambridge, UK: Cambridge University Press.
Thomas, C. D., et al. 2004. Extinction risk from climate change. *Nature* 427: 145–148; doi: 10.1038/nature02121.
Thomas, C.D., A.M.A. Franco, and J.K. Hill. 2006. Range retractions and extinction in the face of climate warming. *Trends in Ecology and Evolution* 21 (8): 415–416; doi: 10.1016/j.tree.2006.05.012.
Thompson, A., P. Robbins, B. Sohngen, J. Arvai, and T. Koontz. 2006. Economy, politics, and institutions: from adaptation to adaptive management in climate change. *Climatic Change* 78: 1–5; doi: 10.1007/s10584-006-9095-5.
Vandall, J., N. Henderson, and J. Thorpe. 2006. *Suitability and Adaptability of Current Protected Area Policies under Different Climate Change Scenarios: The Case of the Prairie Ecozone, Saskatchewan*. Saskatoon, SK: Saskatchewan Research Council.
Vedwan, N., and R.E. Rhoades. 2001. Climate change in the Western Himalayas of India: A study of local perception and response. *Climate Research* 19: 109–117.
Welch, D. 2005. What should protected areas managers do in the face of climate change? *The George Wright Forum* 22 (1): 75–93.
West, J.M., S.H. Julius, P. Kareiva, C. Enquist, J.J. Lawler, B. Peterson, A.E. Johnson, and M.R. Shaw. 2009. US natural resources and climate change: Concepts and approaches for management adaptation. *Environmental Management* 44 (6): 1001–1021; doi: 10.1007/s00267-009-9345-1.
Wiersma, Y.F., T.J. Beechey, B.M. Oosenbrug, and J.C. Meikle. 2006. *Protected Areas in Northern Canada: Designing for Ecological Integrity*. CCEA Occasional Paper no. 16. Ottawa, ON: CCEA.
WWF [World Wildlife Fund]. 2003. *Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems*. Washington, DC: WWF International.

Christopher J. Lemieux, Centre for Applied Sciences in Ontario Protected Areas / Interdisciplinary Centre on Climate Change, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Ontario N2L 3G1 Canada; cjlemieux@uwaterloo.ca

Thomas J. Beechey, Canadian Council on Ecological Areas (CCEA), 91 Cooper Street, Cambridge, Ontario N3C 2N5 Canada; tombeechey@sympatico.ca

Daniel J. Scott, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Ontario N2L 3G1 Canada; dj2scott@envmail.uwaterloo.ca

Paul A. Gray, Applied Research and Development Branch, Ministry of Natural Resources, 300 Water Street, Peterborough, Ontario K9J 8M5 Canada; paul.gray@ontario.ca

GEORGE
WRIGHT
SOCIETY

P.O. Box 65
Hancock, Michigan 49930-0065
USA

www.georgewright.org

Better knowledge, better decisions, better parks