

Burning across Boundaries: Comparing Effective Strategies for Collaboration Between Fire Management Agencies and Indigenous Communities in the United States and Australia

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IN THE PAST FEW DECADES, fire scientists and land managers have come to recognize the value of fire as a land management tool. This represents an advance not only in the ways in which landscapes are managed but in the relations between US and Australian indigenous communities and government agencies, placing the two on a more equal footing. Scientific studies of past fire regimes and measurements of biodiversity continue to suggest that some landscapes are adapted to burning, and fire can be necessary to promote ecosystem health.¹ Scientific data also show that regular burning prevents catastrophic wildfires that result from excessive fuel buildup.² These lessons have been well known to indigenous communities in Australia and the United States for centuries; before European settlement, burning the land was part of caring for it. US and

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This article was originally published in its unabridged form as Burr's undergraduate honors thesis in Stanford University's Department of Earth Systems. Research for this thesis and article was conducted through the Bill Lane Center for the American West.

¹ On the impact of fire on biodiversity, see D. Bowman, "The Impact of Aboriginal Landscape Burning on the Australian Biota," *New Phytologist* 140 (1998): 385–410; and for more detail on humans' historical use of fire, see Stephen J. Pyne, *World Fire: The Culture of Fire on Earth* (New York: Henry Holt, 1995).

² See R. Bliege Bird et al., "Aboriginal Burning Buffers Climate-Driven Fire-Size Variability in Australia's Spinifex Grasslands," *PNAS Early Edition* (2012): 1–6.



Burr, Judee. "Burning Across Boundaries: Comparing Effective Strategies for Collaboration between Fire Management Agencies and Indigenous Comm." *Occasion: Interdisciplinary Studies in the Humanities* v. 5 (March 1, 2013), <http://occasion.stanford.edu/node/122>.

Australian land management agencies are now moving away from blanket policies of fire suppression, creating a logical space for indigenous communities to reinstate healthy fire regimes in their traditional homelands and contribute to the growing debate about how fire can best be applied to the land.

Collaborations between indigenous communities and land management agencies have been used effectively to fill this space. These collaborations have positive implications for healthy fire-prone landscapes, indigenous rights, and better relationships between indigenous communities and land management agencies. These are opportunities to support the legitimate role that indigenous knowledge can play in fire management and support indigenous peoples' managerial rights over landscapes that have traditionally been theirs. All stakeholders who care about the health of these landscapes will benefit from the application of indigenous fire knowledge to land management practices in these areas.

In this essay I will analyze and compare four success stories: four indigenous communities engaging with land management agencies to preserve and, in some cases, reinstitute traditional fire regimes that serve both cultural and conservation outcomes. These are the Martu in the Western Desert of Australia, the Northern Kaanju people of Australia's Cape York Peninsula, the Karuk Tribe of the Klamath/Siskiyou region in California, and the North Fork Mono of the Sierra Nevada foothills in Madera County, California. These groups are all becoming involved in efforts to reintroduce controlled fire to the land and are attempting to collaborate with government-based land management agencies in these efforts. These communities have in common a connection to homeland that is sustained through the right kind of fire and appropriate land management. They also share the difficulty of building a trusting relationship out of one that has historically been oppressive, and the difficulty of needing to build such relationships with agencies and governments in order to maintain the places and the resources that are important to their communities. Battles over land rights persist in these indigenous communities, but they have used collaboration to implement culturally important fire practices when confronted by contested land tenures. Parallels between these communities offer opportunities for these groups to exchange experience and support across cultures and continents. These four communities were chosen because they have collaborated successfully with agencies, and they have begun to communicate with each other at an international scale.

Based on these four case studies, I will examine which political tools and kinds of engagement contribute to effective fire management collaborations. "Effective collaborations" are those that support the rights and well-being of indigenous communities, allow agencies to achieve their fire management goals with indigenous peoples as serious partners, and have positive ecological outcomes for the land. I will particularly assess the policies that govern the land management rights of indigenous communities and those that mediate their relationships with agencies. By comparing the successes and challenges of four specific collaborations, I will highlight a set of guidelines for more successful collaborative fire management.

The results of this comparison show that formal agreements are important for the establishment of a long-term relationship between agencies and indigenous communities, but that research on fire management outcomes, collaborative meetings, appropriate nongovernmental organization (NGO) involvement, innovative leadership, and education are powerful factors in determining a collaboration's effectiveness. These are not universally applicable mandates but general strategies that have supported collaborative fire work in these communities and may have benefits for those engaged in similar processes elsewhere.

BACKGROUND

Evidence from charcoal and pollen records,³ written observations of eighteenth- and nineteenth-century European explorers,⁴ and recognizable fire-adapted features of vegetation⁵ suggest that contemporary Californian and Australian ecosystems have been molded by fire for millions of years. In addition to fires caused by lightning, indigenous communities in Australia and the United States set fire to the land for thousands of year prior to European colonization, intentionally burning where it suited their needs.⁶ In both Australia and the United States, fires were used by indigenous communities to hunt, to rejuvenate plant communities that could attract game, or to care for plants used for basket weaving, among other uses.⁷ The extent to which these activities altered the landscape has been contested on the grounds that populations were too small and indigenous technology too minimal to have had a significant impact.⁸ But recent studies emphasize the power of fire to alter the landscape far beyond the scale of the individual wielding the fire stick—the frequency and timing of indigenous burns made them very different from lightning-caused fires.⁹ When Europeans arrived in Australia and the United States, they did not find a “wilderness” but a landscape that had been carefully cultivated for human habitation by indigenous people using fire.¹⁰

As indigenous communities had transformed the land with regular, controlled burns, so European colonists fundamentally altered the landscape through fire suppression. Being one of the most fire-prone landscapes in the United States, California was a hot spot for debate on the merits of “light burning,”—that is, controlled, human-set fires based on indigenous practices. Yet the

³ See A. P. Kershaw et al., “A History of Fire in Australia,” in *Flammable Australia: The Fire Regimes and Biodiversity of a Continent*, ed. Ross A. Bradstock, Jann E. Williams, and A. Malcolm Gill (Cambridge: Cambridge University Press, 2002), 3–25.

⁴ See K. F. Higgins, *Interpretation and Compendium of Historical Fire Accounts in the Northern Great Plains* (Washington, DC: US Department of the Interior, Fish and Wildlife Service, 1986); and R. J. Fensham, “Aboriginal Fire Regimes in Queensland, Australia: Analysis of the Explorer’s Record,” *Journal of Biogeography* 24 (1997): 1–22.

⁵ See H. H. Biswell, *Prescribed Burning in California Wildlands Vegetation Management* (Berkeley and Los Angeles: University of California Press, 1989).

⁶ See Stephen J. Pyne, *Burning Bush: A Fire History of Australia* (New York: Holt, 1991); K. Anderson, *Tending the Wild: Native American Knowledge and the Management of California’s Natural Resources* (Berkeley and Los Angeles: University of California Press, 2005); Biswell, *Prescribed Burning in California Wildlands*; Bowman, “Impact of Aboriginal Landscape Burning”; J. Russell-Smith et al., “Aboriginal Resource Utilization and Fire Management Practice in Western Arnhem Land, Monsoonal Northern Australia: Notes for Pre-history, Lessons for the Future,” *Human Ecology* 25 (1997): 159–95; and N. D. Burrows et al., “Evidence of Altered Fire Regimes in the Western Desert Region of Australia,” *Conservation Science Western Australia* 5 (2006): 272–84.

⁷ See R. W. Kimmerer and F. K. Lake, “The Role of Indigenous Burning in Land Management,” *Journal of Forestry* (2001): 36–41; Anderson, *Tending the Wild*; Burrows et al., “Evidence of Altered Fire Regimes”; and R. Poirier and D. Ostergren, “Evicting People from Nature: Indigenous Land Rights and National Parks in Australia, Russia, and the United States,” *Natural Resources Journal* 42 (2002): 331–51.

⁸ See D. R. Horton, “The Burning Question: Aborigines, Fire and Australian Ecosystems,” *Mankind* 13 (1982): 237–51; and J. E. Keeley, “Native American Impacts on Fire Regimes of the California Coastal Ranges,” *Journal of Biogeography* 29 (2002): 303–20.

⁹ See Biswell, *Prescribed Burning in California Wildlands*; Anderson, *Tending the Wild*; G. W. Williams, “Introduction to Aboriginal Fire in North America,” *Fire Management Today* 60, no. 3 (2009): 8–12; and H. T. Lewis, “Management Fires versus Corrective Fires in Northern Australia: An Analogue for Environmental Change,” *Chemosphere* 29 (1994): 949–63.

¹⁰ See Bill Gammage, *The Biggest Estate on Earth: How Aborigines Made Australia* (Sydney: Allen and Unwin, 2012); Anderson, *Tending the Wild*; and W. M. Denevan, “The Pristine Myth: The Landscape of the Americas in 1492,” *Annals of the Association of American Geographers* 82 (1992): 369–85.

association with Native American practices and the prevalent idea that fire was harmful to forests resulted in policies that completely suppressed fires for most of the twentieth century.¹¹ In Australia the impossibility of complete fire suppression was more obvious to foresters, who recognized the role of fire in farming, controlling fuel levels, and even fighting fire. However, European foresters still conceived of fire suppression as an ideal and sought to eliminate fire from the landscape wherever possible.¹² Foresters declared sections of forest in the United States and Australia to be protected areas, in which they sought to prevent fires.¹³ Once foresters suppressed the regular, low-intensity burns that indigenous communities had conducted, fuels began to build up in the undergrowth and create opportunities for deadly fires to erupt.¹⁴ Intensive European pastoralism, the introduction of foreign biota, and other disturbances also made the Californian and Australian landscapes increasingly susceptible to large fires and drastically altered their fire regimes.¹⁵

Forest conditions degenerated and biodiversity declined to such an extent that, around the 1960s, ecologists began to realize that fires were necessary to ecosystem health. Fuels were building up in areas that had previously been managed by indigenous fire, and the increased intensity of the fires that resulted caused management agencies to reevaluate their practices.¹⁶ In the 1960s, with the passage of the Wilderness Act in 1964 and the Leopold Report, written in 1963, foresters in the United States began to reconsider their policies of systematic fire suppression.¹⁷ Prescribed fire was then reintroduced at the end of the 1960s, but it was not until 2008 that the policy of suppressing every wildfire before 10 a.m. the next day was officially replaced by an “appropriate management response” policy, with which US fire managers could let fires burn when environmental conditions allowed them to be appropriately monitored.¹⁸ Australian policy makers were forced to accept the importance of prescribed burning after the devastating Black Friday fires in Victoria in 1939. The Stretton Report of 1939 brought attention to the need for preventive burning in Australia, and in 1953 the Forests Department conceded the need for

¹¹ See R. Trosper, “Now That Paiute Forestry Is Respectable Can Traditional Science and Knowledge Work Together?” (unpublished paper, 2007); D. Carle, *Burning Questions: America’s Fight with Nature’s Fire* (London: Praeger, 2002); and Stephen J. Pyne, *America’s Fires: Management on Wildlands and Forests* (Durham, NC: Forest History Society, 1997).

¹² See Pyne, *Burning Bush*.

¹³ See *ibid.*; and Pyne, *America’s Fires*.

¹⁴ See G. Busenberg, “Wildfire Management in the United States: The Evolution of a Policy Failure,” *Policy Studies Association, Review of Policy Research* 21 (2004): 145–56; D. A. Dellasala et al., “Beyond Smoke and Mirrors: A Synthesis of Fire Policy and Science,” *Conservation Biology* 18 (2004): 976–86; and S. L. Stephens and L. W. Ruth, “Federal Forest Fire Policy in the United States,” *Ecological Applications* 15, no. 2 (2005): 532–42.

¹⁵ See Pyne, *World Fire*; and Thomas R. Dunlap, *Nature and the English Diaspora: Environmental History in the United States, Canada, Australia, and New Zealand* (Cambridge: Cambridge University Press, 1999).

¹⁶ For studies on increased fire intensity following European settlement, see N. D. Burrows, B. Ward, and A. D. Robinson, “Jarrah Forest Fire History from Stem Analysis and Anthropological Evidence,” *Australian Forestry* 58 (1995): 7–16; and D. J. Ward, B. B. Lamont, and C. L. Burrows, “Grasstrees Reveal Contrasting Fire Regimes in Eucalypt Forest before and after European Settlement of Southwestern Australia,” *Forest Ecology and Management* 150 (2001): 323–29.

¹⁷ See Pyne, *America’s Fires*.

¹⁸ See *ibid.*; R. Lasko, “Implementing Federal Wildland Fire Policy—Responding to Change,” *Fire Management Today* 70, no. 1 (2010): 5–7; and B. McManus et al., “Interagency Prescribed Fire: Planning and Implementation Procedures Guide” (US Department of Agriculture and US Department of the Interior, 2008).

burning in its protected forests.¹⁹ However, the public understanding of fire is still dominated by the idea of fire suppression, and in both the United States and Australia, it has been difficult to translate the need for more prescribed fire into additional acres burned.²⁰

The recognition of fire as a valuable land management tool and the recognition of indigenous rights have occurred somewhat concurrently. Not only did colonization remove fire from the land, but genocides occurred in these places as part of the colonial effort to assimilate indigenous people and wipe out their cultures.²¹ Reconciliation between governments and the indigenous communities that they have historically wronged means establishing a mutually respectful relationship and recognizing where indigenous people have a right to ownership of the land and a right to equal say in land management.

This reevaluation of the role of indigenous knowledge in land management is occurring globally, thereby creating opportunities for indigenous communities around the world to compare and learn from each others' experiences. International knowledge exchange between Australia and California specifically has been fruitful. One example is the collaborative land management work between Kowanyama, a community on the western coast of the Cape York Peninsula, and tribes in Washington State. Kowanyama is widely regarded as one of the most successfully managed Aboriginal communities in this fragmented Cape York region²²—and their management framework has largely been developed from knowledge exchanges with tribes in Washington State. This international relationship began in 1990, when David Whitener, the chairman of the Squaxin Island Tribal Council, attended the Mitchell River Watershed Conference to share the experiences of Washington State tribes in working with multiple stakeholders on the Timber Fish and Wildlife Agreement.²³ This exchange continues today, as community members at Kowanyama and tribal representatives from Washington continue to visit, discuss, and learn from each other. The community at Kowanyama was united in the desire to protect their homeland and determined to do so on their own terms. Learning how other indigenous communities had successfully managed their water resources assisted them in creating a successful management structure. As this case demonstrates, international partnerships and conversations between communities can be productive and meaningful additions to forming local collaborations.

Collaborative fire management on lands that are important to agencies and indigenous communities is an effective way of continuing a dialogue between these two parties, with positive implications for indigenous rights and healthy landscapes. The four communities profiled below are unique, steeped in specific histories, places, and cultures, but they are also bound together in a cross-cultural and international conversation about fire management. Leaders in these communities agree that collaboration is the way forward, and they have devised means to persist, negotiate, and ultimately work around obstacles hindering appropriate fire management

¹⁹ See A. M. Gill, "Post-settlement Fire History in Victorian Landscapes," in *Fire and the Australian Biota*, ed. A. M. Gill, R. H. Groves, and I. R. Noble (Canberra: Australian Academy of Science, 1981), 77–98; and Pyne, *Burning Bush*.

²⁰ See J. Hoggett and A. Hoggett, "When Will We Ever Learn?" *Backgrounder* 16 (2004): 1–15.

²¹ See Trosper, "Now That Paiute Forestry Is Respectable Can Traditional Science and Knowledge Work Together?"

²² J. Russell-Smith (consultant ecologist, Bushfire Cooperative Research Center), interview with the author, March 26, 2012; and V. Steffensen (managing director, Muulong Productions), interview with the author, March 24, 2012; and V. Sinnamon (manager, Kowanyama Natural Resources Management Office), interview with the author, March 26, 2012.

²³ See V. Sinnamon, "Kowanyama: Bottom End of the Watershed" (unpublished report, Kowanyama Aboriginal Land and Natural Resources Management Office, 2011).

practices. The brief overview of these four case studies below is followed by an analysis of the policies and practices that support effective fire management collaborations between agencies and indigenous communities.

Case Study 1: Martu and the Department of Environment and Conservation (DEC), Western Desert, Australia

The Martu community referred to in this case study is the foraging community whose traditional homelands surround Lake Disappointment, the Rudall River, and the Percival Lakes in the Western Desert of Australia. About one thousand people in this region use the term “Martu” as self-reference.²⁴ Parnngurr and Punmu are two Martu “outstations,” or satellite desert communities, located on Martu traditional homeland.²⁵ The diversity of life found in the desert has adapted to the fine-grained fire mosaic of Martu burning,²⁶ and fire use remains an important part of Martu culture today.

In 2002 Martu native title was recognized over 136,000 square kilometers of their traditional homeland.²⁷ The Native Title Act of 1993 gave Aboriginal people a legislative mechanism by which their rights to the land can be acknowledged. Although native title is not equivalent to complete ownership of the land and all its resources, it recognizes the past and present connection that native titleholders have with the land and allows access to traditional resources²⁸ and maintenance of cultural sites and memories.²⁹

Native title gave the Martu people formal rights to consultation with the Department of Environment and Conservation (DEC) on land management decisions in the region. DEC is

²⁴ R. Bird and D. Bird, “Anthropogenic Fire, Human Foraging Strategies and Ecosystem Dynamics in the Western Desert of Australia” (proposal submitted to the National Science Foundation on August 15, 2008).

²⁵ Ibid.

²⁶ See N. Burrows, “Using and Sharing Indigenous Knowledge,” in *Australia Burning: Fire Ecology, Policy, and Management Issues*, ed. G. Cary, D. Lindenmayer, and S. Dovers (Collingwood: CSIRO, 2003), 205–10; D. Bird, R. Bliege Bird, and C. H. Parker, “Aboriginal Burning Regimes and Hunting Strategies in Australia’s Western Desert,” *Human Ecology* 33 (2005): 443–64; and Bird et al., “Aboriginal Burning Buffers Climate-Driven Fire-Size Variability in Australia’s Spinifex Grasslands.”

²⁷ See F. J. Walsh, “To Hunt and to Hold: Martu Aboriginal People’s Uses and Knowledge of Their Country, with Implications for Co-management in Karlamilyi (Rudall River) National Park and the Great Sandy Desert, Western Australia” (PhD diss., School of Social and Cultural Studies and School of Plant Biology, University of Western Australia, 2008).

²⁸ I will use the terms “traditional knowledge,” “traditional homelands,” “traditional owners,” and “traditional resources” to designate the long-term connection between indigenous communities and the places and resources they have utilized over these thousand-year timescales. “Traditional” or “indigenous” knowledge refers to the understanding of the land that has developed from these long-term relationships. Berkes defines traditional ecological knowledge as “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment”; Fikret Berkes, *Sacred Ecology: Traditional Ecological Knowledge and Resource Management* (Philadelphia: Taylor and Francis, 1999), 7. “Traditional owners” refers to the people with long-standing connections to an area of land, and “traditional homelands” refers to the area to which people have this connection. These terms can be problematic, but these concerns will not be discussed here. It is important to note that emphasizing the foundational nature of “traditional knowledge” in these cultures does not imply that communities’ understandings of the world are static or unchanging.

²⁹ See H. Zeppel, “Native Title, ILUAs and Indigenous Development Opportunities in National Parks” (PowerPoint presentation at 17th Annual Native Title and Cultural Heritage Forum, Brisbane, 2010).

charged with managing fire on “unallocated Crown land” in Australia,³⁰ and as native title land falls into this category, it remains under DEC’s political jurisdiction. Part of Martu traditional homeland in Karlamilyi National Park remains a contested area between the Martu and DEC, but the Martu have established a suite of successful collaborative projects with DEC. These range from biodiversity assessment to feral-camel management, culminating in collaborative fire management activities that continued to take shape throughout 2012.³¹ The Martu NGO Kanyirninpa Jukurrpa (KJ) facilitates these collaborative projects, supported by government grants. Leaders in DEC, such as fire scientist Neil Burrows and conservation leader Cath Rummery, and in KJ, such as the director of Land Management Programs, Peter See, have played an instrumental role in planning collaborative work between DEC and the Martu community.

Case Study 2: Northern Kaanju People and the Australian Government’s Indigenous Protected Areas Program, Chuula, Cape York Peninsula, Queensland, Australia

The Northern Kaanju people are indigenous to the central Cape York Peninsula, and their traditional homelands encompass about 8,400 square kilometers around the Wenlock and Pascoe River system.³² After years of fire suppression, today many areas on Kaanju traditional homeland are not being burned, are being damaged in large, destructive wildfires, or are being burned at the wrong time of year at the expense of valued biodiversity.³³ In this rural region, the Queensland Rural Fire Service is charged by the government with managing fire, and the Queensland Parks and Wildlife Service controls fire management in national parks on the peninsula.³⁴

The Northern Kaanju people have taken steps to reinstitute traditional fire management by collaborating with the Australian government to create an Indigenous Protected Area (IPA) over 1,975 square kilometers of their traditional homelands. An IPA is a parcel of land that joins Australia’s National Reserve System but remains under the management of traditional owners.³⁵ Led by traditional owner David Claudie, the Northern Kaanju people have worked with multiple organizations, such as the Wilderness Society, to get the necessary funding to implement proper fire management practices across this landscape, and they are currently writing a fire management plan for this area.³⁶ In addition to the work centered in the IPA, collaborations with fire management agencies and surrounding landowners have been important steps to implementing

³⁰ See Department of Environment and Conservation, Western Australian Government, “Corporate Plan, 2007–2009” (July 1, 2006).

³¹ See A. McGilvray and P. Kendrick, “Biodiversity of the Western Desert: Looking after Country with the Martu Traditional Owners,” *Landscape* 26 (2010): 33–39; P. See (director of Land Programs, Kanyirninpa Jukurrpa), interview with the author, March 28, 2012.

³² See D. Claudie, “Inquiry into Indigenous Economic Development in Queensland and Review of the Wild Rivers (Environmental Management) Bill 2010” (Chuulangun Aboriginal Corporation, Submission to House of Representatives Standing Committee on Economics, Submission 22, February 16, 2011).

³³ See D. Claudie, S. Kennedy, and R. Nelson, “Kaanju Fire Management Strategy” (unpublished paper, November 2011).

³⁴ See Queensland Department of Community Safety, “Rural Fire Service” (2012), available online at ruralfire.qld.gov.au (last accessed on March 20, 2012); and Queensland Parks and Wildlife Service, “Fire Management: Managing Parks and Forests” (brochure, September 2011).

³⁵ See Claudie, “Inquiry into Indigenous Economic Development in Queensland and Review of the Wild Rivers (Environmental Management) Bill 2010.”

³⁶ See Claudie, Kennedy, and Nelson, “Kaanju Fire Management Strategy.”

better fire management on a regional scale. A fire management workshop was held on the Northern Kaanju traditional homelands, giving traditional owners the opportunity to impart important fire knowledge to the land managers who attended.³⁷ The possibilities for community empowerment and region-wide collaboration are increasing with the introduction of Australia's Clean Energy legislation. Beginning in July 2012, this plan aims to take control of carbon pollution and transform Australia's economy by encouraging increasing investments in clean energy.³⁸ This is an opportunity for Aboriginal Australians because this plan includes the Indigenous Carbon Farming Fund—monetary compensation for projects conducted by Aboriginal communities, including the Northern Kaanju, that help to mitigate carbon emissions by methods that include fire management.³⁹

Case Study 3: The Karuk Tribe, the Bureau of Indian Affairs, and the US Forest Service, Klamath/Siskiyou Bioregion, California, USA

The Karuk Tribe is indigenous to the Klamath/Siskiyou region of northern California. They are a federally recognized tribe and are engaged in a “government-to-government” relationship with the US federal government—this means they possess the status of a nation in relation to the US government and retain the right to self-government.⁴⁰ Karuk tribal lands consist of tribal trust lands and individual tribal trust properties spread along the Klamath River between Orleans and Yreka. Traditionally, Karuk homelands spanned close to 5,600 square kilometers within the Klamath River basin. Today, tribal lands span just 3.21 square kilometers, and nearly all lie adjacent to the USDA Forest Service's Klamath and Six Rivers National Forests.⁴¹

With federal recognition but little tribal land, the tribe's Department of Natural Resources has been negotiating the tribe's involvement in fire management through the Bureau of Indian Affairs (BIA) and the US Forest Service. The tribe is involved in fire management on their homelands through their Fire/Fuels Reduction Program and BIA-funded fire crew, led by Karuk member Bill Tripp.⁴² Through the fire crew, they are able to participate with agencies on prescribed burns and to operate as a local fire-fighting unit.

Collaborative projects with the Forest Service have gone beyond the agency's basic statutory requirements of tribal consultation and created an opportunity to advance tribal fire management goals despite questions of land tenure. Most of these projects are in the planning stages. The tribe has worked with the Forest Service to plan for the collaborative management of the

³⁷ D. Hankins (associate professor, Geography and Planning Department, California State University, Chico), interview with the author, September 18, 2011.

³⁸ For more information about the Clean Energy Initiative, see Australian Government Clean Energy Future, “Overview of Clean Energy Legislative Package” (2012), available online at cleanenergyfuture.gov.au/wp-content/uploads/2012/05/CEF-overview_Apr2012.pdf (last accessed on December 21, 2012).

³⁹ *Ibid.*; and Australian Government, Department of Climate Change and Energy Efficiency, “Methodologies” (April 23, 2012), available online at www.climatechange.gov.au/government/initiatives/carbon-farming-initiative/methodology-development/ (last accessed on December 21, 2012).

⁴⁰ US Department of the Interior, Bureau of Indian Affairs, “Frequently Asked Questions,” available online at bia.gov/FAQs (last accessed on December 21, 2012).

⁴¹ See Karuk Tribe Department of Natural Resources, “Eco-cultural Resources Management Plan Draft” (June 15, 2010), available online at karuk.us/karuk/departments/natural-resources (last accessed on March 3, 2012); and A. Alkon and J. Agyeman, *Cultivating Food Justice: Race, Class, and Sustainability* (Cambridge, MA: Massachusetts Institute of Technology, 2011).

⁴² See Karuk Tribe Department of Natural Resources, “Eco-cultural Resources Management Plan Draft.”

Karuk Environmental Management Practice Demonstration Area, an area of about 40 square kilometers in the Six Rivers National Forest. A report on this partnership was coauthored and signed by the Forest Service with the Karuk Tribe in 2005, although burning has yet to begin.⁴³ A memorandum of understanding (MOU) has also been established between the Karuk Tribe and the Forest Service across the Klamath and Six Rivers National Forests to continue cooperative fire management between these two parties.⁴⁴ These documents are used to formally state mutual benefits and concerns of the tribe and the agency over a specific area or issue, delineate the responsibilities of the agency and the tribe in resource management, and, in the case of fire management, specify areas of responsibility during fire incidents.⁴⁵ The tribe is also working to establish an Eco-cultural Resources Management Plan that describes the tribe's concerns regarding the management of their traditional homelands. Once the Forest Service approves this plan, the agency will have to refer to this document in their management activities.⁴⁶ Federal recognition has given the tribe a voice in the political process, and many opportunities remain to improve consultation practices and initiate collaborative work that will address fire management challenges in the area.

Case Study 4: North Fork Mono and the US Forest Service, Sierra Nevada Foothills, Madera County, California, USA

The traditional homelands of the North Fork Mono extend along the trails of the western slope of the Sierra Nevada in the watershed of the San Joaquin River, and many tribal members continue to live in these areas today.⁴⁷ The North Fork Mono maintained this open landscape with fire prior to the arrival of European colonists,⁴⁸ but today much of North Fork Mono traditional land is encompassed by the Sierra National Forest and managed by the US Forest Service. The tribe is petitioning for federal acknowledgment but remains unacknowledged. Members of the North Fork Mono control over 4,000 hectares of tribal trust land today, and the tribe has also been a registered nonprofit organization since 2002.⁴⁹ Ron Goode is the tribal chairman of the North Fork Mono Tribe.

Ron Goode has worked to represent the interests of the North Fork Mono in collaborations with land management agencies like the US Forest Service. The tribe and the Forest Service have an MOU that is used to uphold the tribe's rights to access and resource use in the Sierra National Forest.⁵⁰ Goode also represents tribal perspectives at collaborative meetings on land management between agencies and stakeholders; he helped to plan the California State Tribal Water Summit of 2009, where agencies and tribes came together to discuss water man-

⁴³ Ibid.

⁴⁴ See B. Tripp, "Traditional Ecological Knowledge as a Basis for Assessment, Implementation, Research/Monitoring, and Reassessment" (PowerPoint presentation at Klamath Fire Ecology Symposium, Orleans, CA, April 26, 2011).

⁴⁵ See F. Lake, "Working with American Indian Tribes on Wildland Fires: Protecting Cultural Heritage Sites in Northwestern California," *Fire Management Today* 71 (2011): 14–21.

⁴⁶ B. Tripp, interview with the author, November 22, 2011.

⁴⁷ See Anderson, *Tending the Wild*; and Edward W. Gifford, "The North Fork Mono," *University of California Publications in American Archaeology and Ethnography* 32 (1932): 15–65.

⁴⁸ See Anderson, *Tending the Wild*.

⁴⁹ Ron Goode (tribal chairman, North Fork Mono), interview with the author, October 28, 2011.

⁵⁰ See Ron W. Goode, *Cultural Traditions Endangered* (Clovis, CA: Eagle Eye Enterprises, 1992).

agement in California.⁵¹ Goode has instigated fire management projects in collaboration with the Forest Service to restore the land at a number of different culturally significant sites in Forest Service territory.⁵² Recent changes to the Forest Service Planning Rule also mean that there are more opportunities for tribal input and public comments on Forest Service projects.⁵³ These changes, as well as collaborative meetings facilitated by NGOs like the Sierra Nevada Conservancy and by the Forest Service tribal relations program, are creating opportunities for traditional knowledge to be shared with land managers.⁵⁴ Education has also been a priority—Goode has been collaborating with Jared Aldern, a professor at Prescott College, Prescott, Arizona, on an educational curriculum based on California Native American relationships with the land. Educational initiatives and successful collaborative projects continue to enhance the ability of the North Fork Mono Tribe to carry out their traditional fire practices.

COMPARATIVE ANALYSIS

A number of themes emerge from the experiences of these communities: the cultural and ecological benefits of fire use, the importance of community leadership, the powerful role of NGOs in forwarding collaborative work, the ability of collaborative planning documents and MOUs to facilitate collaboration, and the importance of educating agency land managers, young indigenous people, and the public about fire and indigenous culture. In this section I will analyze these commonalities among the four case studies, which can guide communities and agencies looking to form meaningful fire management collaborations.

Environmental Benefits of Traditional Burning

The importance of fire in each of these fire-prone ecosystems is what makes collaborations between communities and fire management agencies feasible and advantageous in each case. Early European settlers witnessed the positive effects of indigenous fire knowledge on the US and Australian landscapes—knowledge that was applied in indigenous land management practices for thousands of years.⁵⁵ Now, many scientific studies confirm the positive correlation between the practice of traditional fire management today and ecosystem health. For example, research in the Western Desert has demonstrated that desert biodiversity is much higher, and wildfires are much smaller, in areas where the Martu burn.⁵⁶ In the Cape York Peninsula, then James Cook University PhD candidate Peta Standley worked with Kuku Thaypan elders Tommy George and Dr. George Musgrave to measure the importance of traditional burning techniques for biodiver-

⁵¹ See “2009 California Tribal Water Summit Proceedings, Protect Our Sacred Water” (Radisson Hotel, Sacramento, November 4–5, 2009), available online at www.waterplan.water.ca.gov/docs/tws/CTWS_ProceedingsFull_v2df_02-08-10.pdf (last accessed on December 21, 2012).

⁵² See J. Minkler, “North Fork Mono Restoration Project,” in *Native Voices* (video, 2011).

⁵³ See USDA, Forest Service, Pacific Southwest Region, “Forest Plan Revision” (February 8, 2012).

⁵⁴ See Sierra Nevada Conservancy, State of California Natural Resources Agency, “Strategic Plan” (September 2011); E. Brown and M. Vance, “Addendum to Willow Creek Landscape Analysis: Community Values, Desired Conditions and Suggested Strategies, V-4” (Sierra Nevada Conservancy, Willow Creek Collaborative Planning Process, January 30, 2012); and USDA, Forest Service, “Tribal Relations Strategic Plan, 2011–2013” (September 2009).

⁵⁵ See Higgins, *Interpretation and Compendium of Historical Fire Accounts in the Northern Great Plains*; Fensham, “Aboriginal Fire Regimes in Queensland, Australia”; and Pyne, *World Fire*.

⁵⁶ See R. Bliege Bird and D. Bird, “Why Women Hunt: Risk and Contemporary Foraging in a Western Desert Aboriginal Community,” *Current Anthropology* 49 (2008): 655–93; and Bird et al., “Aboriginal Burning Buffers Climate-Driven Fire-Size Variability in Australia’s Spinifex Grasslands.”

sity maintenance on Kuku Thaypan homelands.⁵⁷ The university bestowed an honorary “Doctorate of Letters” on each of these two elders for their research, which demonstrated the relevance of traditional burning techniques in current fire management.⁵⁸ The success of the Western Arnhem Land Fire Abatement project in Australia's Northern Territory is another example of the power of scientific monitoring applied to indigenous burning practices. Largely based on the success of this project, the Indigenous Carbon Farming Fund will include funding for savanna-burning projects conducted by Aboriginal communities.⁵⁹

Frank Lake, a descendant of Karuk and Yurok peoples, and Don Hankins, a Miwok fire scientist who has worked with the Northern Kaanju, have been conducting similarly important research studies on fire usage in California. Lake's dissertation examined the effects of fire in sandbar willow communities along the Klamath River, and he continues to research the effects of fire on tan oaks in the Klamath.⁶⁰ Hankins teaches about the ecological importance of fire in ecosystems at California State University, Chico, and he has been engaged in multiple burning projects that scientifically establish the beneficial effects of fire in plant communities. Future initiatives for the fire research collaborative include more burning and monitoring projects to support the goals of tribes like the North Fork Mono.

Conducting more scientific research in each of these places is critical in order to receive funding and demonstrate to land managers, who conduct their activities based on scientific knowledge, that traditional knowledge should be listened to, researched, and incorporated into land management activities. The best research will emulate the models shown here—designed just as much to empower communities as to explore scientific information. Traditional knowledge backed by scientific data has greater influence on agencies that make decisions based on the best scientific information, thereby supporting collaborative work.⁶¹

Implementing Traditional Fire Regimes

To realize the environmental benefits of traditional fire on the land, communities must be able to implement burns on their own terms or in collaboration with agencies. Both of these possibilities have met resistance in California, but small successes hold promise for the future.

Conducting traditional burns is much more difficult for the North Fork Mono Tribe and the Karuk Tribe than for the Martu and the Northern Kaanju in Australia. Smoke regulations in

⁵⁷ See *Fire and the Story*, film documentary directed by Victor Steffensen, managing director at Muulong Productions, Traditional Knowledge Revival Pathways (2007).

⁵⁸ *Ibid.*

⁵⁹ See Australian Government, Department of Climate Change and Energy Efficiency, “Enabling Indigenous Participation: Native Title and Land Rights Land Issues” (Carbon Farming Initiative Consultation Paper, July 2011), available online at www.climatechange.gov.au/government/submissions/closed-consultations/ (last accessed on December 26, 2012).

⁶⁰ See F. Lake, “Traditional Ecological Knowledge to Develop and Maintain Fire Regimes in Northwestern California, Klamath-Siskiyou Bioregion: Management and Restoration of Culturally Significant Habitats” (PhD diss., Stanford University, 2007). See also Frank Lake's contribution to the present volume.

⁶¹ Although “science” and “traditional knowledge” have been characterized as different knowledge systems, they are not actually so different in kind. There is not enough space to discuss this here, but for more detailed commentary on this point, see A. Ross and K. Pickering, “The Politics of Reintegrating Australian Aboriginal and American Indigenous Knowledge into Resource Management: The Dynamics of Resource Appropriation and Cultural Revival,” *Human Ecology* 30 (2002): 187–214; Burrows, “Using and Sharing Indigenous Knowledge; and B. F. Codding, “Any Kangaroo? On the Ecology, Ethnography and Archaeology of Foraging in Australia's Arid West” (PhD diss., Stanford University, 2012).

California frequently stop fire permits from being issued, while in Australia, the air quality regulations rarely prevent prescribed fires from happening. In California, air quality standards should be amended to encourage prescribed fire usage. The North Fork Mono and the Karuk Tribe also face legal ramifications for conducting traditional burns without proper permits, and with a denser urban-wildland interface, burning on tribal trust land is a significant liability concern.

The Northern Kaanju and the Martu retain management control over much larger tracts of land under the Native Title Act and the Indigenous Protected Areas Program. In these cases, agencies recognize the presence of Aboriginal Australians on the land, recognize that these communities are using fire, and mostly do not attempt to regulate communities' traditional burning on their homelands. This does not mean that traditional burning does not still upset many officials—many still do not understand the beneficial role of fire or the relationship that Aboriginal communities have with it. But land managers respect fire as a beneficial ecological force, their respect for Aboriginal communities is growing, and currently these Aboriginal communities are the de facto fire managers on their remote land tenures.

Part of implementing healthier fire regimes is breaking down these political barriers that California indigenous communities face in conducting burns on their traditional homelands. But while questions of land tenure and policy reform are ongoing, California tribes are actively engaging with other opportunities to collaboratively restore fire regimes that meet cultural and ecological goals. Collaborative burning with agencies, even in small fire projects, is a critical tool for California indigenous communities that want to engage in fire management.

Collaborative work is being used in positive ways in Australia as well. The diversity of stakeholders managing land around Northern Kaanju homelands creates opportunities for conversation, as the Northern Kaanju attempt to spread better fire management practices across their territory. In the Western Desert, where lands are contested during the legal process of determining rights to Karlamilyi National Park, DEC recognizes and respects Martu concern for this area and consults with the Martu when doing land management work there. These successes are important for healthier fire regimes and better relationships between agencies and indigenous communities in the future.

Leadership

In each of these four case studies, collaborative fire projects depend on leadership in the communities and agencies. These leaders are taking the initiative to move fire collaborations forward by actively engaging with agencies' policies and practices. Leaders stand out by representing cultural concerns while understanding the language of policy and science, seek out innovative ways to collaborate, and communicate effectively across cultural boundaries. For example, as a forest service scientist and Karuk man, Frank Lake's understandings of tribal and agency concerns allow him to effectively facilitate communication between these groups. Ron Goode's involvement and initiative have allowed the North Fork Mono to engage in numerous land restoration projects, despite being at a legal disadvantage as an unacknowledged tribe. Neil Burrows is an example of an agency representative who has worked to facilitate collaborations between his agency and Aboriginal communities, beyond what is written in the policies of DEC. In Cape York, David Claudie has sought out and engaged with governments and organizations to promote the well-being of Northern Kaanju people and their homelands, advocating for the formation of their IPA and partnering with organizations like the Wilderness Society to implement the right fire management practices. As the leader of the Karuk Fire and Fuels Program, Bill

Tripp has persistently worked to make Karuk cultural values and perspectives clear to Forest Service officials by collaborating on plans and presentations. These are only a few of the people in these collaborative arrangements who have taken leading roles in facilitating conversations. The drive, cross-cultural understanding, patience, and persistence of strong leaders will continue to inspire more effective fire management in a collaborative setting.

The Power of Nongovernmental Organizations

NGOs can play a powerful role in mediating the relationship between communities and land management agencies. The structure of these relationships largely determines the success of implementing community ideas. From these case studies, it seems that whether an NGO plays a positive or a negative role in the collaborative process depends on the NGO's structure and consultation practices and whether its goals and existence are endorsed by the communities it is attempting to serve. The North Fork Mono Tribe is itself a tribal organization, and Ron Goode, the chairman, has facilitated many beneficial fire projects between agencies and the tribe. The Sierra Nevada Conservancy is another NGO that has mediated forums between agencies and tribes that have been a positive contribution to the collaborative process.

In Cape York, the relationship between the Northern Kaanju and regional NGOs has been complicated by the large number of Aboriginal groups and stakeholder interests in the area. Many groups, including the Northern Kaanju, do not feel properly represented by regional NGOs.⁶² However, the Northern Kaanju have successfully established the Chuulungun Aboriginal Corporation, through which they have received funding and worked directly with other NGOs, like the Wilderness Society, and benefited from government programs like the Indigenous Protected Areas Program.

For the Martu, the widespread community support of the NGO KJ's programs, like the ranger program, is evidence that KJ has been successful at consulting with the community and carrying out community-endorsed projects in collaboration with land management agencies like DEC. KJ has been a powerful mediator in acquiring funding to support Martu goals.

The government-to-government relationship between the Karuk Tribe and federal fire management agencies is framed by federal regulations and mediated by the Bureau of Indian Affairs. The bureaucracy associated with this relationship can be a hindrance to collaborative work at times, but this legally accepted and legally moderated relationship with government agencies also establishes tribal rights that the Forest Service and other management agencies must uphold, with positive consequences for collaboration. But, as a result, NGOs have not played the same influential role in facilitating the Karuk Tribe's interactions with government.

NGOs can have a positive influence on collaborative work by facilitating collaborative projects and by representing community interests in these processes. This advocacy is particularly powerful when indigenous community members guide and advise the NGO to ensure that community interests are well represented. Different levels of governmental acknowledgment and self-governance in each community also affect how involved NGOs should be as mediators.

⁶² Victor Steffensen (managing director, Muulong Productions), interview with the author, March 24, 2012; David Claudie (traditional custodian, Northern Kaanju), interview with the author, March 25, 2012; *Right People Talking for Country*, directed by Victor Steffensen (DVD in possession of author).

Planning Agreements and Collaborative Meetings

These case studies have demonstrated that formal planning agreements between agencies and indigenous communities can be powerful tools of collaboration, especially when paired with opportunities for collaborative discussions on fire management. Formal acts and agreements can encourage sustainable collaboration by establishing long-term, mutually beneficial policies between a community and an agency—policies that protect indigenous rights while addressing critical land management questions of mutual concern. For example, the MOU between the Karuk Tribe and the Forest Service specifies the responsibilities of the agency and the tribe in conducting mutually beneficial projects in the Klamath region. This supports a long-term commitment between the Forest Service and the tribe to work together on common objectives and to negotiate conflicts in their priorities over the long term. MOUs may be useful tools elsewhere: potentially as tools of collaboration in regions like Cape York, where multiple stakeholders can outline areas of concern, mutual goals, and a division of fire management responsibility between the community and regional land management agencies. Formal agreements have also mediated aboriginal management of national parks in the Cape York Peninsula under the Cape York Peninsula Heritage Act of 2007. This act allows aboriginal communities to comanage national-park lands and has facilitated new agreements with the Queensland Parks and Wildlife Service—giving aboriginal groups formal rights to participation in land management over these areas.⁶³

Formal planning agreements can also help fight the problem of frequent turnover within agencies. This turnover of officials disrupts the relationships between agencies and communities, which can take an extended amount of time to build.⁶⁴ When coupled with training that allows new agency officials to understand tribal concerns within planning documents, having formal fire management agreements in place with indigenous communities can help maintain continuity. Communities should be involved from planning through implementation, and agency officials should be trained in established consultation methodologies.⁶⁵

Collaborative meetings can strengthen the principles that underlie formal relationships between communities and agencies and can support collaborative fire management in the absence of formal agreements. Legal writ is important to establish indigenous rights, but communication at the local level is also necessary to plan and implement projects.⁶⁶ The North Fork Mono Tribe lacks a treaty-based relationship with the government, but they can effectively communicate with land management officials in community-based conversations that can work their way into policy, as the Willow Creek Addendum (a product of the agency-tribal meetings mediated by the Sierra Nature Conservancy) eventually may do and the 2009 Update of the California Water Plan already does. The North Fork Mono Tribe has conducted a number of collaborative burns with Forest Service officials despite lacking an MOU with the Forest Service that specifically addresses collaborative fire management.

In the Western Desert, plans for fire workshops with the Martu have been initiated by KJ, DEC, and other organizations independently of DEC's legal responsibilities to the community.

⁶³ See Queensland Government Environment and Resource Management, "Joint Management of Cape York Peninsula National Parks" (February 6, 2009).

⁶⁴ Bill Tripp (ecocultural restoration specialist, Karuk Tribe), interview with the author, November 21, 2012.

⁶⁵ See Lake, "Working with American Indian Tribes on Wildland Fires."

⁶⁶ See Ross and Pickering, "Politics of Reintegrating Australian Aboriginal and American Indigenous Knowledge into Resource Management."

Although this fire project has funding for only two years, it is a starting point from which a more sustainable framework of collaborative fire management work can arise.

Collaborative meetings have been an effective form of agency consultation because they devote time and resources to understanding indigenous perspectives. Consultation is much less meaningful when it gives indigenous representatives only a single opportunity to comment on a specific incident—this is insufficient for collaborations concerning fire, which needs to be managed over long time periods. In each case study, the care with which land managers approached communities and the respect with which the recommendations of the communities were treated were crucial parts of the relationship. Involved collaboration paired with MOUs and other formal agreements can create long-term opportunities for collaboration on effective fire management work.

Educational Outreach

It is important for the public to understand that fire can be a positive force in the environment and that indigenous communities today have an important role to play in fire management. Both indigenous communities and fire management agencies view educational outreach to the broader public as a significant priority—the use of film and social media especially emerged from these case studies as powerful tools of education. Curtis Taylor is a Martu man and a film major at Murdoch University, Perth, and he has used his growing expertise to chronicle the lives of the Martu to share with people outside the community.⁶⁷ Victor Steffensen has done similar video work by recording and sharing the traditional burning practices of elders on the Cape York Peninsula through his “traditional knowledge revival pathways” project. Steffensen’s “Living Knowledge Place” curriculum will be adopted in Australian schools as a way of sharing the lives of Aboriginal communities today with indigenous and nonindigenous students across the country. Fire workshops in the Cape York Peninsula have also been successful in disseminating traditional fire knowledge. Traditional fire workshops can be used to teach land managers and community members about the right way to use fire, which can also reduce liability concerns associated with controlled burning. As another way of sharing information, Jared Aldern has created a blog on which he discusses traditional fire concerns with a wider audience.⁶⁸

Understanding indigenous culture is essential to respecting indigenous fire knowledge, which is in turn essential to conducting collaborative work that will restore traditional fire management to the land. Each of these communities has also partnered with institutions of higher education to fulfill community research goals and educate students. Supporting and diversifying these opportunities to share knowledge of fire and indigenous traditions are important steps toward generating respect for the knowledge of these communities and toward creating a public that understands the benefits of controlled fire.

CONCLUSION

This is an exciting and dynamic time for fire management in Australia and California. This essay is brimming with people, projects, and recent policies that are contributing to a more effective fire management strategy—one that involves better outcomes for both the environment and in-

⁶⁷ Videos and blog posts from Curtis Taylor can be found at curiousworks.com.au.

⁶⁸ You can visit Jared Aldern’s blog at www.jareddahlaldern.net/blog/. See also his contribution to the present volume.

digenous communities. The field is primed for collaboration between agencies involved in fire management and indigenous communities who call these fire-prone landscapes home. The four cases that I have featured here have begun to establish these partnerships.

Land management agencies and communities can draw from these experiences to continue improving fire management practice through collaboration. To do this, land management agencies must take steps to ensure that indigenous communities are respected as authorities on fire management issues and consulted as such. The fact that these communities have historically been silenced and oppressed is extremely relevant to the development of collaborative fire management relationships with them. Extra care must be taken to create the level playing field on which these fire management conversations can develop most productively. And based on what they learn from traditional fire managers, land management agencies must be ready and willing to change their current fire management practices. Additional scientific research into traditional fire knowledge can facilitate this process considerably.

Changes in fire management practice may take time to plan and implement, but this study also shows that communication must happen frequently and consistently to effectively lead to these changes. Communities and agencies can establish a long-term commitment to fire management work by creating formal agreements. Establishing mutual goals and responsibilities in an MOU is especially critical when current policies fail to distinguish management responsibilities to the satisfaction of both parties. Both community and agency leaders must contribute the time and effort needed to meet, discuss, and learn from the other.

Finally, indigenous communities and fire management agencies must work together to educate the public and change the norm of fear surrounding fire. Fire management agencies and indigenous communities have a common respect for fire as an important environmental phenomenon—and a shared understanding that people have a role as fire managers. Climate change will only make fire management more important as fire-prone landscapes become more susceptible to large wildfires.⁶⁹ Fire is not going away in Australia or in the United States, as much as people have attempted to suppress it. Creating an understanding that fire is a healthy environmental occurrence and spreading the knowledge of humans as past and present fire managers can help us better understand and react to fire today and into the future.

Lessons from this comparison and a continued exchange of information can inform land management collaborations in similar contexts. The Comparative Wests project, which started at Stanford University and through which this research was conducted, will be a cross-cultural endeavor to encourage interdisciplinary collaboration, promote indigenous sovereignty and identity, and serve as an educational tool for indigenous communities, policy makers, and the research community on the importance and benefits of indigenous fire ecology.⁷⁰ Engaging with these issues in a cross-cultural context will be a rich opportunity for knowledge exchange, which can lead to impactful reforms. To use the inevitable fire pun, let's fan the flames on this process. A

⁶⁹ See M. A. Cochrane and C. P. Barber, "Climate Change, Human Land Use and Future Fires in the Amazon," *Global Change Biology* 15 (2009): 601–12; A. J. Pitman, G. T. Narisma, and J. McAneney, "The Impact of Climate Change on the Risk of Forest and Grassland Fires in Australia," *Climatic Change* 84 (2007): 383–40; D. McKenzie et al., "Climatic Change, Wildfire, and Conservation," *Conservation Biology* 18 (2004): 890–902; and State Board of Forestry and Fire Protection, "2010 Strategic Fire Plan for California" (June 2010).

⁷⁰ Doug Bird (professor of anthropology, Stanford University), interview with the author, March 16, 2012.