

BURNING THE LANDSCAPE:
FIRE AS A CULTURAL RESOURCE MANAGEMENT TOOL

by

CHRISTINA OLSON

(Under the Direction of Wayde Brown)

ABSTRACT

Fire, both natural and anthropomorphic, has sculpted nearly every aspect of human culture. Landscapes are especially prone to the force of fire. Many so called “natural” landscapes designated as national parks and reserves in both the United States and Australia are actually the creations of Native American and Aboriginal fire regimes. Fire suppression in the last 100 years has altered environments, creating new patterns that do not necessarily contribute to the traditional characteristics of the landscapes preserved in national parks and reserves. This document examines the recent shift in cultural landscape management from total fire suppression to the use of controlled and prescribed burning in maintaining specific characteristics in the landscape, and how the renewed use of fire relates to the preservation of certain landscapes. Fire management policies, along with public attitude toward landscape fires pertaining to selected regions of the United States and Australia, are explored and analyzed.

INDEX WORDS: historic preservation; landscape management; cultural resource management; fire management; United States; Australia; California; Northern Territory; Victoria; national parks; Yosemite; Kakadu; Native Americans; Aborigines

BURNING THE LANDSCAPE:
FIRE AS A CULTURAL RESOURCE MANAGEMENT TOOL

by

CHRISTINA OLSON

Bachelor of Science, Southeast Missouri State University, 1999

A Thesis Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfillment of the Requirements
for the Degree

MASTER OF HISTORIC PRESERVATION

ATHENS, GEORGIA

2005

© 2005

Christina Olson

All Rights Reserved

BURNING THE LANDSCAPE:
FIRE AS A CULTURAL RESOURCE MANAGEMENT TOOL

by

CHRISTINA OLSON

| | |
|------------------|--|
| Major Professor: | Wayde Brown |
| Committee: | Pratt Cassity Ian Firth Eric MacDonald |

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
August 2005

TABLE OF CONTENTS

| | Page |
|------------------------------------|------|
| LIST OF FIGURES | v |
| CHAPTER | |
| 1 INTRODUCTION..... | 1 |
| Statement and Purpose..... | 1 |
| Context and Selected Regions | 6 |
| Previous and Similar Studies | 7 |
| 2 HISTORY | 9 |
| History and Myth..... | 9 |
| Prehistoric Fire..... | 14 |
| Historic Fire..... | 22 |
| Early Suppression | 27 |
| 3 CURRENT POLICY..... | 46 |
| Resource Types..... | 46 |
| Jurisdiction..... | 49 |
| Current Policy | 50 |
| 4 CONCLUSION..... | 58 |
| REFERENCES..... | 61 |

LIST OF FIGURES

| | Page |
|---|------|
| Figure 1: “Tokyo loves and American forest fire!” | 13 |
| Figure 2: Australian Settlers | 25 |
| Figure 3: “Mr. Citizen, Mr. Official, Mr. Timberman” | 31 |
| Figure 4: “Distinguished visitors to the Grizzly Giant” | 33 |
| Figure 5: Bambi and the USFS | 36 |
| Figure 6: “Smokey Says...” | 37 |
| Figure 7: Air Tanker | 38 |
| Figure 8: “Ready for the trails” | 47 |
| Figure 9: Crown Fire in the Northern Rockies | 52 |
| Figure 10: Prescribed Burn | 55 |

CHAPTER 1 - INTRODUCTION

1. Statement and Purpose

The ability to manipulate fire separates humans from all other animals on the planet. It is the basis for all of our technology, ancient and modern, from the simple comforts of the hearth to the opulence of a penthouse. If fire were removed from nature and society, “humanity would plunge immediately into a darkness that would make Hobbesian man almost Olympian in comparison.”¹ King Louis, King of the Apes, knew this in the Walt Disney version of the *Jungle Book* when he tried to purchase the “power of man’s red flower” for a song.² Mankind’s ability to exploit fire has allowed us to manipulate the landscape, to create cultures dependant on this manipulation, but has also imparted a responsibility for protecting the cultural landscapes that we have created. Fire is not only a tool to create culture, but to preserve it as well.

Fire has been integral to the formation of the human landscape. It is the great civilizer, common to all societies, enabling us to command the landscapes in which we live. Fire has the duality of not only being a cultural resource, but also being the most powerful tool in creating and managing cultural resources. Without first controlling fire, humankind would never have been able to domesticate plants and animals.³ Fire, whether natural or anthropogenic, has penetrated every niche on the planet. Even the most artificially constructed human environments - New York, Milan, Tokyo - have failed to abolish fire. In agriculture, slash and burn techniques

1 Pyne, 1995.

2 Walt Disney Studios, *The Jungle Book*, 1967.

3 Goudsblom, 1992.

have just recently been replaced (and only in some areas) by the internal combustion engine, which harnesses the energy of fire. In nature preserves, where public agencies have attempted to suppress fire completely, ecosystems degenerate and often wildfire violently reasserts itself.⁴

Fire history mirrors the development of human culture. Fire patterns reflect the landscape in which they burn. In shaping that geography, fire forms regimes, sculpts patterns into the landscape, and records the history of human occupation. When humans captured fire, they gained the ability to manipulate the landscape. As humankind manipulated the landscape, the landscape adapted to the patterns of that culture. The settlement of once nomadic hunter and gatherer peoples and subsequent development of human culture employed fire cycles adapted by humans for agricultural and hunting practices. Eventually the landscape evolved and became dependant on the fire patterns created by human culture. By commanding fire, humanity has been able to direct the history of the planet and create the landscapes in which we live.⁵

Johan Goudsblom writes, “In using fire for hunting, human groups changed the land they inhabited – at first perhaps inadvertently, and later deliberately. The most drastic transformations were to occur after the emergence of agriculture and modern industry. Yet, as early in the stage when human groups subsisted wholly by gathering and hunting, they were already making a strong imprint on the landscape. Their chief agent in doing so was fire.”⁶ By manipulating the landscape with fire, prehistoric people created the first cultural landscapes, changing the form and the function of the land itself. Historic humans came to regard these landscapes as natural. Colonists and academics, lacking the humility to understand aboriginal cultures and denying the ingenuity of social structures based on oral, rather than material,

4 Pyne, 2001.

5 Pyne1995.

6 Goudsblom, 1992.

traditions, believed random acts of nature had produced the open landscapes discovered on the North American and Australian continents. Many landscapes became dependant on fire cycles developed by native cultures, cultures defined by the domestication of their surroundings. Once these cycles changed to comply with European colonization, the encroaching societies began to apply labels to the landscapes with European cultural values. European agricultural and settlement patterns created landscapes deemed civilized in comparison to hunter and gatherer landscape patterns.

As settlements grew into cities, landscapes became more and more regulated. Modern societies developed urban cultures, removing fire from everyday activity and confining it to the rural and wild areas. As populations began accumulating in urban centers, regulatory authorities attempted to develop towns and cities into fire free zones, permitting fire only in specific confines. Fire in the city was a menace, not a tool, which resulted in the destruction of culture rather than refinement.⁷ When fire did escape from its mandated confines, the destruction was magnificent. The 1666 London fire devoured 13,000 homes.⁸ In 1871, the Great Chicago Fire consumed 17,500 buildings. Following the 1906 San Francisco earthquake, flames consumed 28,000 commercial and residential structures.⁹ Around the turn of the twentieth-century, as European settlers moved further into landscapes that had been fire cultivated by natives, developers began to contain fire all together. In the United States, the Forest Service, established in 1905, and the National Park Service (NPS), established in 1916, groomed an entire generation of foresters to suppress fire completely. The basis of this policy was to prevent the recurrence of

7 Pyne, 1999.

8 Lyons, 1985.

9 Rosen, 1986.

firestorms, such as the 1910 Fires¹⁰ and the earlier Peshtigo Fire, still fresh in the minds of forest stewards.¹¹ In Australia, the government discouraged folk burning. The public began to view fire not as a tool of civilization, but an erratic force to suppress in order to preserve the landscape, both urban and wild. By taking fire from the landscape, the cultural patterns cultivated there began to disappear.¹²

At the turn of the twenty-first century, the general attitude in landscape management toward fire encompasses it as a cultivation and a management tool. With this shift in attitude comes a shift in landscape management policies. The question now is whether these policies use fire effectively in the preservation of cultural landscapes. Rangers, foresters, and preservationists painstakingly manage the landscapes of national parks, preserves, and reserves to replicate the landscapes discovered by European colonists. Often, preservationists do not take into consideration fire patterns carved into the landscape by Native American and Aboriginal inhabitants prior to the arrival of Europeans in several of these areas. Given the “Euro-North American folk view that fire is inherently destructive, it is not surprising that uses of habitat fire have not been widely recognized as important to the adaptations of hunter-gatherers” and “nomadic pastoralists.”¹³ In many instances, the resources preserved are not natural landscapes, but early cultural landscapes. Preservation Brief Number 36, *Protection Cultural Landscapes: Planning, Treatment and Management of Historical Landscapes*, from the United States

10 In August 1910, wildfires ripped through nearly five million acres of Rocky Mountain forests in northern Idaho and Montana. Eighty-five people were killed; among them seventy-eight were fire fighters. A long drought and uncooperative winds pushed flame through slash (cleared vegetation) and debris created by logging, mining, and road construction. Foresters and fire fighters who survived the 1910 fires would be iatrical in creating Forest Service fire management policy well into the first half of the twentieth-century. Source: Carle, 2002.

11 The Peshtigo Fire erupted on October 8, 1871 in the lumber town of Peshtigo, Wisconsin, situated on the Peshtigo River. Prolonged drought and slash and burn land clearing techniques employed for agriculture, industry, and construction of the railroad combined to create a devastating inferno. The fire consumed nearly 1.5 million acres and left between 1,200 and 2,400 dead. Burning the same night as the Great Chicago Fire, the Peshtigo Fire was far more devastating, but failed to gain the notoriety of the Chicago fire. Source: Holbrook, 1943. See Also: Pyne, 1997.

12 Pyne, 1991.

13 Lewis, *American Anthropologist*, December 1998.

National Park Service defines cultural landscapes as geographical areas, “including both cultural and natural resources and the wildlife or domestic animals therein” exhibiting “cultural or aesthetic values.” Historic landscapes “are composed of a number of character-defining features which individually or collectively contribute to the landscape’s physical appearance as they have evolved over time.”¹⁴ In most cases, national parks and preserves are also ethnographic landscapes, comprised of “a variety of natural and cultural resources that associated people define as heritage resources,” which can include “massive geological structures... small plant communities, animals” and “substance and ceremonial grounds.”¹⁵

Throughout, fire continues to be a major factor in the creation and maintenance of these landscapes. Management professionals should not overlook it as either a resource or a preservation tool. Fire, when referred to as a landscape maintenance tool, generally encompasses prescribed burns on both public and private lands – for purposes of this document, fire will refer to prescribed burns on public lands, as well as naturally occurring fires (those fires ignited by lightning) which alter the landscape. Man-made fire is the primary source of landscape burning in the world. Today it is “nearly impossible to discriminate between the influences of climatic change, biotic migrations, natural fire, and aboriginal firing in the landscape.”¹⁶ Forestry and fire professionals can use carefully managed fire to clear undergrowth without harming mature trees.¹⁷ The preservation of certain landscapes and biota¹⁸ depends on fire to ward off encroaching vegetation. Fire is an undeniable asset in preserving historic and ethnographic landscapes.

14 Birnbaum, NPS Brief #36.

15 Ibid.

16 Smith, 1999.

17 Rossotti, 1993.

18 bi-o-ta (noun): all the organisms in a given area; the total complement of animals and plants in a particular area. Source: Merriam-Webster Online, 2005.

Certain fire suppression techniques can be more damaging to cultural landscapes than actual fire. Recently, agencies responsible for the protection of culturally significant landscapes worldwide have become more conscientious of the effects of fire suppression. Preservationists and fire management professionals have worked together to revise current fire policy to better address historic preservation issues concerning cultural landscapes, but do these revised policies effectively use fire to manage those landscapes? By exploring the history and current policy concerning fire management in the landscapes of selected regions of the United States and Australia, this document will uncover which policies are appropriate and which are detrimental to the character of the landscapes that they were instituted to protect.

2. Context and Selected Regions

The thesis will consider landscapes and fire management procedures related to public lands in the United States and Australia. This document will specifically discuss resources and management devices in Yosemite National Park in the United States, and Kakadu National Park in Northern Australia.

Yosemite National Park is located in the central Sierra Nevada Mountains of north-central California, 150 miles east of San Francisco. Yosemite was designated a World Heritage Site in 1984 and is “internationally recognized for its spectacular granite cliffs, waterfalls, clear streams, giant sequoia groves, and biological diversity.”¹⁹ The park covers 1,200 square miles and two federally designated wild and scenic rivers, the Merced and Tuolumne, which begin within Yosemite park boundaries and flow west into California's Central Valley. Yosemite is one of the largest and least decimated areas of habitat in the Sierra Nevada range, supporting a

¹⁹ U.S. Department of the Interior, National Park Service. Yosemite National Park: Nature and History.

multiplicity of vegetation and wildlife. Yosemite is home to nearly twenty percent of California's native plant species. Threats to park resources and the integrity of park landscapes include loss of natural fire regimes,²⁰ impact due to high visitation in specific areas of the park, and the invasion of non-native flora and fauna.²¹

Kakadu National Park, located in Australia's Northern Territory, encompasses landscapes that range from sand dunes and mangrove forests along the coastal areas to inland areas of tall, open eucalyptus forests with spotty understory of palms, shrubs and grasses. The grasses are primarily sorghum and are extremely flammable in the dry season. The remaining areas of the park consist mainly of "freshwater floodplains, paper bark swamps and small stands of rain forest."²² The Australian Department of Environment and Heritage jointly manage the park in conjunction with aboriginal groups (the Bibij and Munggy) who have traditionally lived on the land now incorporated into the park. The aboriginal inhabitants believe that "spiritual ancestors of aboriginal people during the Creation Time" shaped the landscape.²³

3. Previous and Similar Studies

Similar studies include reports detailing the effects of prescribed burns²⁴ and wildfires on specific resources, as well as fire management sections of cultural resource management reports and fire management standards for various national parks. The NPS includes a fire management

20 A fire regime is the "combination of fire frequency, predictability, intensity, seasonality, and size characteristics of fire in a particular ecosystem." Source: National Park Service. Glossary of Fire Terms. ,2004.

21 U.S. Department of the Interior, National Park Service. Yosemite National Park: Nature and History.

22 Lewis, *American Anthropologist*, December 1998.

23 Australian Government, Department of Environment and Heritage. Kakadu National Park. 2005.

24 A prescribed burn or fire is, "any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition." Source: National Interagency Fire Center (NIFC), 2004.

section in each cultural resource management report written for any given resource. The Fire Management Division of the NPS is responsible for surveying and documenting cultural resources and landscapes and developing fire management procedures accordingly. The Forest Service, as custodian of the National Forests of the United States, is responsible for assessing cultural and historical resources when creating or improving fire management policies. Supporting documents for policy amendments incorporate these assessments. Similar reports and assessments occur in Australian park management plans. There is also a sizable body of anthropological studies, which explore various types of ethnographic evidence concerning the use of fire in prehistoric and historic landscape management.

CHAPTER 2 – HISTORY

1. History and Myth

The capture of fire by humans was the capture of power – it made humans unique from all other animals on earth. In myths of all cultures, either fire was a gift to humankind or stolen by humankind. In Greek mythology, Prometheus stole fire from Zeus and gave it to the human race. Loki, the Norse god of fire (whose mother was a mortal), brought fire to the hearth. In some Native American stories, the mythological character Bear lost Fire, which resulted in Fire giving itself to humans. Once they learned how to feed it, Fire promised to take care of humans, if humans took care of it in a reciprocal symbiosis.²⁵ Native Americans of the Pacific Northwest believed the god Yehi took the shape of a raven and stole a burning branch, which fell on stones and trees placing fire within them. In New Zealand, the aboriginal hero Mani created flame from the nail of his divine grandmother. Mani, however, killed the fire and had to beg for another nail to kindle more fire, but the second fire he also smothered. Mani kept asking for fire and putting it out until all of his grandmother's nails were gone and she chased him with flames. The rain came to Mani's rescue and the sparks of his grandmother's fire became lodged in the flint and wood of the land.²⁶

Other animals recognized the opportunities presented by fire, but only humans learned to control and exploit fire. Animals congregate in freshly burned areas to lick crystallized salts from the ashes, absorb warmth from heat trapped in the earth, and to escape insects. Like other

²⁵ Page and Ingpen, 1985.

²⁶ Rossotti, 1993.

animals, humans may have started by following fire to areas where it occurred naturally. Domestication began when humans first discovered how to transport and nurture it, and then created hearths in their dwellings. Once the domestication of fire and creation of the hearth had occurred, the continuation of fire control, or the culture of fire, depended on cultural traditions that ensured fire would not be lost. Fire control relates directly to individual, and societal, self-control. The fire tender had to be at ease with flame, and neither too aroused nor too timorous but a sexy balance of knowledge and confidence. “Social coordination was needed... to ensure there would always be someone to look after the fire. Cultural transmission was needed if the skills, as well as the sense of responsibility and duty associated with the use fire, were not to be lost,” while “social coordination and cultural transmission were necessary preconditions for the domestication of fire; they were also reinforced by it.”²⁷ Though humans captured and exploited fire, it was the humans who had to capitulate to the needs of the fire. By shaping fire to suit our needs, the needs of fire shaped human culture.

Fire creates and destroys in fairly predictable cycles making the belief in a beginning-and ending-fire nearly universal in ancient and modern societies. Flame consumes the phoenix at each end of its mystical life cycles, from which the bird is reborn. In Babylonia, Girru embodied both the technological aspects of fire as a metal smith, and the holy fires of sacrifice and purification from iniquity, personifying man’s ability to create both good and evil from fire. Agni, the ancient Hindu fire god actually had two faces, one face which depicted devastation, and the other the munificence of fire. His three limbs were symbolic of the three manifestations of flame. In the shape of the sun, fire brought forth crops and fertility in the earth, as lightning fire was vengeful, and in the hearth, fire gave warmth to humanity and carried prayers to the

²⁷ Goudsblom, 1992.

Vedic gods.²⁸ The effects of fire that humans noticed around them in nature facilitated the original beliefs that fire would one day destroy the world in order to create another. Like Adam and Eve eating the fruit of knowledge, fire made humans more god-like, giving us the power to create and destroy. In taking fire, however, humans had also taken the responsibility of managing fire in the landscape. By the controlled use of fire, humans tamed nature and attained an identity that separated them from other animals. Increasingly, as human society urbanized, technology separated combustion from fire. Without periodic burning, the landscape fell in to disorder. When Prometheus brought fire to earth, he also unleashed the monsters from Pandora's Box.²⁹ Knowledge brings with it responsibility. Ignore those responsibilities and they will grow into monsters.

The vision of the world-ending fire has remained while the idea of the world-creating fire has all but vanished. Modern metaphors have almost completely erased the symbol of fire as creator. Pyne writes: "In the modern world fire is as much of a victim as a villain. The unsettling of the planet's ecology has thrown into confusion the role of fire and the responsibility of humans to manage it. The unwarranted suppression of fire has damaged the earth as much as its promiscuous misuse. The elimination of fire from the world will not save the planet from destruction but only abolish the regeneration that it once promised should follow."³⁰ The movement of populations away from lifestyles directly related to the land has removed the sense of responsibility for the management of the land. With the loss of responsibility comes a loss of personal familiarity with fire. Popular media, especially television, has perpetuated fire as an

28 Rossotti, 1993.

29 Page, and Ingpen, 1985.

30 Pyne, 1995.

agent of evil against the environment and against society, depicting flame as “an unrelenting nuisance that the world would be wise to discard.”³¹

Contemporary imagery associates fire almost exclusively with destruction, whether it is through unregulated slash and burn practices in the Amazon, wildfires scorching through Yellowstone National Park, smoking oil wells in the Middle East, or Los Angeles after the Rodney King riots. After the 1910 Fires in the American west, various sorts of suppression-aimed propaganda demonized fire. The Forest Service and other forestry organizations regularly portrayed fire as pure evil. Posters that proclaimed, “Death Rides the Forest When Man Is Careless” depicted the Grim Reaper riding through the woods with a torch. Other posters featured flaming devils, touting “The Destroyer- Keep Him Out of the California Woods.”³² In the American South, fire prevention slogans and posters took up with good old-fashioned hatred “against the needless, ruthless destruction of our most valuable natural resources.”³³

In the 1940’s, war posters claimed, “Tokyo loves an American forest fire,” and “Careless Matches Aid the Axis!” The posters portrayed Nazi and Japanese soldiers, even Hitler and Emperor Hirohito, gleefully stoking flames lapping at American timber reserves.³⁴ Stewart Holbrook wrote about the patriotic citizen’s duty to prevent wildfire in his book *Burning an Empire*, published in 1943. Holbrook put into prose national feelings of civic duty, discussing the need to keep the Pacific Coast clear from fire and smoke as a measure of home front security.³⁵ Bambi lost his home to fire, and Smokey Bear reminded us that only we, the American public, could prevent forest fires, further removing fire from the hands of the average

31 Pyne, *Whole Earth*, Winter 1999.

32 Carle, 2002.

33 Conarro, *American Forests* April 1939.

34 Carle, 2002.

35 Holbrook, 1943.

citizen.³⁶ Ironically, the ad agency that created Smokey Bear the marketing tool, generally ignored the live Smokey Bear, rescued from the Captain Gap fire in the Lincoln National Forest in New Mexico, due to his lack of market appeal. In the 1980s, Forest Service officials dropped conservation themes from Smokey Bear posters as they thought the themes distracted too much from Smokey's message of fire prevention.³⁷



Figure 1: World War II fire prevention poster. (Carle, 1992.)

More disturbing imagery emphasizing the caustic qualities of fire broadcast relentlessly by news programs include the badly burned victims of Hiroshima, napalm-fired jungles and villages in Vietnam, the World Trade Center burning and collapsing to the ground, and the smoking rubble where cities once stood in the Iraqi desert. These myriad negative media

³⁶ Walt Disney Studios, *Bambi*, 1942

³⁷ Carle, 2002.

portrayals have reinforced a strong association between fire and utter devastation.³⁸ Contemporary humans generally regard fire with apprehension, due to the removal of fire from the common person's routine coupled with the aforementioned negative fire imagery. There is no reason, however, to believe that prehistoric humans felt any trepidation in using fire as a tool. Current fire use regulations and restrictions have so separated most members of society from fire "that fears which strike us as 'natural' and 'rational' may be the result of the very process of the domestication of fire."³⁹

2. Prehistoric Fire

Natural fire on earth first started between 400 and 450 million years ago. At that time, the elements necessary for the existence of fire were all in place. Fire is the combination of three basic parts, fuel, spark, and oxygen. These parts react with one another in a chemical process called combustion, in which the fuel interacts with oxygen to create a spark and ignite the landscape. Fuel generally comes from vegetation and decaying biomass. A spark can be the product of spontaneous combustion or, more commonly, lightning. Lightning is still the most common source of ignition for wildfires. Around four hundred million years ago, marine life evolved the ability to release oxygen through biochemical process.⁴⁰ Those initial fires would have resembled the fuels on which they were burning. As is true of fire today, the fuel feeding a fire will dictate the behavior of that fire. Pre-historic fires were likely as different from modern fires as prehistoric vegetation was different from modern vegetation.⁴¹ As fire burned through

38 Pyne, 1997.

39 Goudsblom, 1992.

40 Ibid.

41 Pyne, 2001.

the primordial environment, natural regimes were formed, making the landscape somewhat dependant on fire for regeneration.

Eventually, humans progressed, capturing fire and becoming dependant upon it for heat, light, and cooking. With the power of fire, humanity also acquired the responsibility of domestication. Domestication created cultural traditions and social patterns. With fire, humankind was able to produce the technology that allowed us to conquer an inhospitable earth. This conquest forced humans into the role of cultural stewards. Fire became not only the tool to create civilization, but also the tool with which to tend culture.⁴²

Hunter and gatherer groups throughout North America and Australia manipulated fire to clear land and flush game from the bush. Native American and aboriginal Australians also employed fire to discourage predators and to smoke out insects and small parasites. After wildfire thinned out the underbrush, fruits and nuts presented themselves more readily to gatherers. As ecologies became adapted and eventually dependant upon fire, prehistoric people recognized the benefits of burning areas to encourage specific plant growth, which in turn would attract game animals. Burning of forestlands to create pastures attracted grazing animals such as bison and elk. Certain species of trees, such as oaks and pines, need the heat from fire to germinate. Broadcast fires would have ensured supplemental food sources.⁴³ Deliberate landscape fires may also have had specific emotional and social connotations as well. “Setting fire to a piece of land could be a way of ‘appropriating’ the land... and establishing dominion over it,” shaping the landscape to reflect cultural ideals.⁴⁴ In recent history, slash and burn techniques have acquired a reputation of global vandalism, however, when first conceived by

42 Pyne, 2001.

43 Rossotti, 1993.

44 Goudsblom, 1992.

prehistoric people, slash and burn represented an important process in the development of civilization. The immediately destructive effects of fire were utilized in a longer-term ecological strategy” which required “elaborate technological and social skills.”⁴⁵ The process of slash and burn under prehistoric conditions created a very fertile environment for agricultural practices, the next step of domestication.

United States

Prior to the arrival of Europeans, nearly all Native American groups exploited natural fire patterns to facilitate hunting and gathering practices. Native Americans set ground fires in forested landscapes, which preserved the canopy. In chaparral landscapes, Native Americans burned fires with moderate intensity leaving a pattern of intermixed age classes throughout the live vegetation.⁴⁶ Large game mammals gathered and grazed on grasses and saplings in pastures cleared by annual fires. Certain trees are dependant on fire for germination and nut production. Forest fire regimes ensured the production of nuts and cleared undergrowth for gathering. Before European settlement, maize, squash, and beans were cultivated with slash and burn agriculture, however, when Europeans first began to settle in North America, agriculture occupied very little of the landscape. Early settlers in what is now the northeast did find “an open and park-like landscape, with very little undergrowth.”⁴⁷ Northeastern tribes lit broadcast fires semi-annually to maintain the open forest landscape. Accounts of the Battle of Cowpens in the Revolutionary War depict a cavalry battle fought in the open forest of what would become South Carolina. Local native tribes had managed that area with prescribed burns for generations to create pastoral hunting grounds. Later generations of European settlers discovered a sea of open prairies when

45 Goudsblom, 1992.

46 Smith, California Department of Forestry and Fire Protection, 1999.

47 Goudsblom, 1992.

they reached the Midwest. In Yosemite, the Miwok people used controlled burning to produce the patterns of oaks and grasslands described by the first Europeans who traveled to the area.⁴⁸ Although the vast open spaces seemed to be *primaeval*, they were actually the result of burning practices of regional Native Americans. Great Plains hunters systematically burned large tracts of forests to produce grasslands that attracted buffalo and other big game.⁴⁹ Prehistoric fire regimes, natural and man-made, still exist in several areas of North America. Midwestern prairies, such as those in Missouri, burn on an annual cycle. The fire regime of Pacific Northwest pine forests includes a ten-year fire cycle, and forests in Alaska and Canada complete fire cycles about every 150 years.⁵⁰ Through all of these practices, prehistoric American cultures changed and shaped the landscape. As the fire patterns disappeared from the landscape due to European encroachment, prairie hunting grounds filled in with trees and undergrowth consumed open space in the forests.⁵¹

As the native guardians of the ancient fire regimes disappeared, so did the ancient fire regimes. The livestock of European settlers cleared out fuels that were once the basis for annual fire cycles. Exotics from the Old World moved into burned areas to create new landscapes, and although fire use and control changed, it alone was not sufficient to change the landscape.⁵² Although various factors influenced the form of cultural landscapes, anthropogenic fire was by far the most prominent.

Ecological and anthropological evidence suggests that Native Americans practiced controlled burning to promote eco-diversity in the landscape. While European settlers generally

48 U.S. Department of the Interior, National Park Service. Yosemite National Park: Nature and History, 2005.

49 Goudsblom, 1992.

50 Rossotti, 1993.

51 Pyne, 1995.

52 Ibid.

burned to create uniformity in the landscape to accommodate agriculture and livestock, Native Americans depended on the diversity found in the edge effect. By burning to create pastures and meadows, Native Americans created a mosaic of habitats throughout the forest. Gerald W. Williams writes, “Keeping large areas of forest and mountains free of undergrowth and small trees was just one of many reasons for using fire in ecosystems. . . . This activity has greatly modified landscapes across the continent in many subtle ways, often interpreted as natural by the early explorers, trappers, and settlers. Even many research scientists who study pre-settlement forest and savannah fire evidence tend to attribute most prehistoric fires to lightning (natural) rather than by humans. This problem arises because there was no systematic record keeping of these fire events. Thus the interaction of people and ecosystems is downplayed or ignored, which often leads to the conclusion that people are a problem in ‘natural’ ecosystems rather than the primary force in their development.”⁵³ The “Great American Forest,” being the idealized, pristine, natural landscape promoted in National Park Service visitor pamphlets, may be “more a product of settlement than a victim of it.”⁵⁴

Australia:

Australia is constantly on fire, or so it seems. The survival of the land mass itself is dependant on the torrents of flame that rip through the bush in regular cycles. The continent of Australia has a specific environment on which large, intense fires thrive and will return with predictable patterns and nearly every ecosystem in Australia depends on fire for survival in one capacity or another. The Australian land mass is so vast that fires can rage unchecked by natural regulators that occur in other regions with similar climates and environments. There are no

⁵³ Williams, USDA Forest Service, 2001.

⁵⁴ Pyne, 1997.

terrain channels to contain winds, or bodies of water to pump moisture into the air as the winds travel across them.⁵⁵ In addition to the weather, the majority of the vegetation in Australia makes a ready fuel for wildfire.

Aboriginal Australians classified Australian landscapes by the resources that each one provided. Burning by Aboriginal groups was important in developing habitat patterns specialized to specific flora and fauna. The extinction of various plant and animal species may actually be a result of the change in fire regimes due to European colonization, as well as competition for habitat between imported livestock and crop species. In order to obtain maximum benefits from each landscape, Aboriginal landscape burning followed seasonal changes and the harvest of staple foods. Burning usually occurred in the first half of the winter dry season, controlling low intensity fires by timing ignition by predicted weather changes. By producing a mosaic of burned and unburned landscape, Aborigines used the burned areas as firebreaks and managed fires lit later in the year. Aboriginal Australians protected fire sensitive rain forests, believed to be the home of temperamental gods, with firebreaks produced in this manner. Unlike later European colonists, Aboriginal Australians did not possess the technological skills to extinguish expansive fires. Instead, Aborigines managed landscape fires by “predicting the behavior and spatial extent of fire” based on traditional knowledge.⁵⁶ Once lit, Aborigines left fires to burn. Depending on weather and fuel conditions, the extent of the fires ranged from localized areas to vast expanses of land. Western Aborigines were especially adapted at using fire for land clearing, hunting, and “regenerating senescent vegetation.”⁵⁷ Aboriginal Australians were aware that fires of different intensity, frequency and seasonality

55 State of Victoria, Department of Sustainability and Environment, 2004.

56 Lewis, *American Anthropologist*, December 1998

57 Bowman. *New Phytologist* November 1998.

were an integral part of their environment. Aboriginal burning practices derived from an understanding of how fire effected the “distribution and relative abundance of plant and animal resources.”⁵⁸

Anthropologist Rhys Jones referred to Aboriginal Australian use of fire in the landscape as “fire-stick farming,” creating desired effects in the landscape through the use of a torch.⁵⁹ Stephen Pyne refers to Aboriginal fire as an “enabling device” with the power to “restructure whole landscapes.”⁶⁰ Aboriginal Australians “used fire to massage the indigenous environment so skillfully that they became, in effect, cultivators of that landscape.”⁶¹ Studies have concluded that Aborigines understood the ecology of the landscape around them and understood how to manipulate fire to minimize their impact while reaping the greatest benefits from the biota.⁶² Aboriginal Australians routinely set the landscape ablaze well into the nineteenth-century. Early English travelers who witnessed the deftness with which they worked their fire-sticks were astonished at the control they conjured over such a volatile medium. Aboriginal fire was not merely an ecological practice. Aborigines use fire as a housekeeping tool for the landscape. They believe that it is mankind’s responsibility to keep the land from becoming dirty with built up fuels to avoid catastrophic conflagrations.⁶³ While much of the flora and fauna in Australia does depend on annual fire regimes, aboriginal Australian landscape burning was also sociological and psychological, an investment in the land “entitling people to certain rights of usage and creating emotional ties to it.”⁶⁴

58 Lewis, *American Anthropologist*, December 1998.

59 Jones, *Australian Natural History*, 1969.

60 Pyne, *The Journal of American History*, March 1990

61. Ibid

62 Bowman, *New Phytologist*, November 1998.

63 Lewis, *American Anthropologist*, December 1998.

64 Goudsblom, 1992.

Anthropologist Henry T. Lewis documented the reactions of Aboriginal Australians to the overgrown forests on Maria Island in the Gulf of Carpentaria. Scientists from the Commonwealth Scientific and Industrial Research Organization (CSIRO) visited the island in the 1980s, which humans had abandoned for almost thirty years. The wild vegetation resembling a resurgent rain forest amazed the scientists. Aboriginal Australians who accompanied the party, however, saw the scene as a “bloody mess,” and quickly began setting fires to reclaim the land into a form suitable for human habitation.⁶⁵ “Aboriginal burning ensured not only the pervasiveness of Australian fire but its permanence.”⁶⁶ Unsuppressed, aboriginal fires burned continuously. Explorers equated fire with Aborigines. The flames and trails of smoke were navigational guides to watering holes, hunting grounds and travel corridors.

Evidence found in the ethnographic landscapes of Australia leaves little doubt of the development and management of landscapes colonized by Europeans by Aboriginal fire practices. The open woodlands in New South Wales were likely a result of Aboriginal landscape burning.⁶⁷ European settlers reshaped the continent again with fire. Adapting the Aboriginal fire-stick, European settlers soon discovered that the burned landscape would produce optimal pastures for their livestock. Colonization extensively reconstructed Australian fire regimes. For European species to thrive, colonists strived to mimic the environs of Europe on their newly colonized continent. The Australian landscape changed so much due to the removal of Aboriginal fire cycles that the extinction of native biota followed. Colonists came to define their identity through bush fire, as an icon and a literary metaphor that described themselves and their

65 Lewis and Ferguson,” *Human Ecology* 1988.

66 Pyne, 1995.

67 Bowman, *New Phytologist*, November 1998.

landscape. Australians' common reliance on fire bound them to the fire-drenched landscape, creating a codependence from which there was no escape.⁶⁸

3. Historic Fire

United States:

Before the turn of the twentieth-century, European settlers regarded forest fires in the western United States as part of the natural forest process. Native Americans used fire to clear out the forest understory for hunting. European settlers did more than replicate Native American fire practices with agricultural and industrial burning: they multiplied it several fold. The 1880 census forest summary recorded vast amounts of forestlands lost due to burning. When representatives for the National Academy of Science toured the newly formed forest reserves in 1896, smoke was constantly in the view shed. As much forest land as the logging industry had devastated, the agricultural fires of European settlers destroyed, much more.⁶⁹

In the newly established frontier settlements of the late 1800's, settlers viewed fire as practical and benevolent. The public regarded wild fire control as "impossible in a traditional sense, indefensible in an economic terms, and undesirable on environmental grounds."⁷⁰ The overall feeling was that the devastation of wildfires was regrettable, although the fires would evaporate as European settlers tamed the landscape. The general cultural and political assumption was that as wild lands disappeared under agricultural pressures, so would wild fires. However, the conversion of public lands into parks and forests did not allow for "laissez-faire fire management."⁷¹

68 Pyne, 1991.

69 Pyne, 1995.

70 Pyne, 1997

71 Ibid.

In the southern United States, colonial settlement patterns responded to clearing created by Native American fire regimes more readily than any other area of the United States. The large number of Scottish colonists that settled there brought with them free range ranching practices that easily assimilated into native fire regimes.⁷² In traditional Scottish ranching practices, ranchers left their cattle to graze on common ground. Scottish settlers in the South treated the open clearing created by Native American burning techniques as common pastures. In order to maintain these new common lands, Southern ranchers and farmers adapted Native American fire traditions and combined them with folk fire practices from the Old World.⁷³

Beginning in the late 1800s and continuing in to the early 1900s, the United States government consolidated public lands into national parks and reserves. Fire suppression became the default land-management tool for parks and reserves. Corporate forest owners in the southern and western United States, after acquiring large tracts of timberlands that were once public lands, developed new burning practices that would produce high timber yields. Smaller ranchers and farmers often turned to arson as a means to protest and a way to reclaim traditional resources to which they felt entitled. Even as rural fire practices disappeared in other areas of the country, and public attitude toward landscape fire turned toward disdain, Southerners maintained fold burning practices well into the twentieth century.⁷⁴

Australia:

Historic fires of epidemic proportions have generally followed a change in the landscape brought on by European colonization. In 1851, the Black Thursday fire followed widespread, intensive grazing and preceded a massive gold rush in Victoria. In 1898, the Red Tuesday fires

72 Kuhlken, 1999.

73 Pyne, 1982.

74 Kuhlken, 1999.

swept across the Bass Strait, devastating land that had been clear-cut for marginal farming. The 1926 Black Sunday fires ravaged reserved forests and crown owned lands where management policies had suppressed traditional fire cycles or snuffed them out completely. Black Friday came in 1939 with colossal fires that pillaged the colonial landscape. These fires, combined with the hardship of WWII, created the social atmosphere of reform that would create the Australian Strategy of bush fire protection.⁷⁵ In 1983, the Ash Wednesday Fires swept through areas of southeastern Australia, devastating the built landscape and its residents.⁷⁶ In the Snowy River Valley of New South Wales, the change from Aboriginal to European burning practices resulted in a sudden occurrence of fire damaged tree rings, indicating increased fire intensity. Studies of dendrochronology conducted in the mid 1990s indicate that there was a “dramatic change in the frequency of intense forest fires in southwest Western Australia following European colonization.”⁷⁷ In southeastern Victoria along the Delegate River, there also existed destructive burning that subsided only after fire suppression measures instituted in the 1940s.⁷⁸

Black Thursday was significant as the first of Australia’s gargantuan blazes to mark European colonization of the continent. A wetter than normal winter combined with summer temperatures over 100 degrees Fahrenheit had created carpets of thick grassy fuels. On February 6, 1851, fire erupted from both lightning and folk burning, and descended on the colonists from all sides. While the devastation was significant, rains following the fires rejuvenated the landscape and the colonies.

75 Pyne, 1991.

76 Lewis, *American Anthropologist*, December 1998.

77 Bowman, *New Phytologist*, November 1998.

78 Ibid.

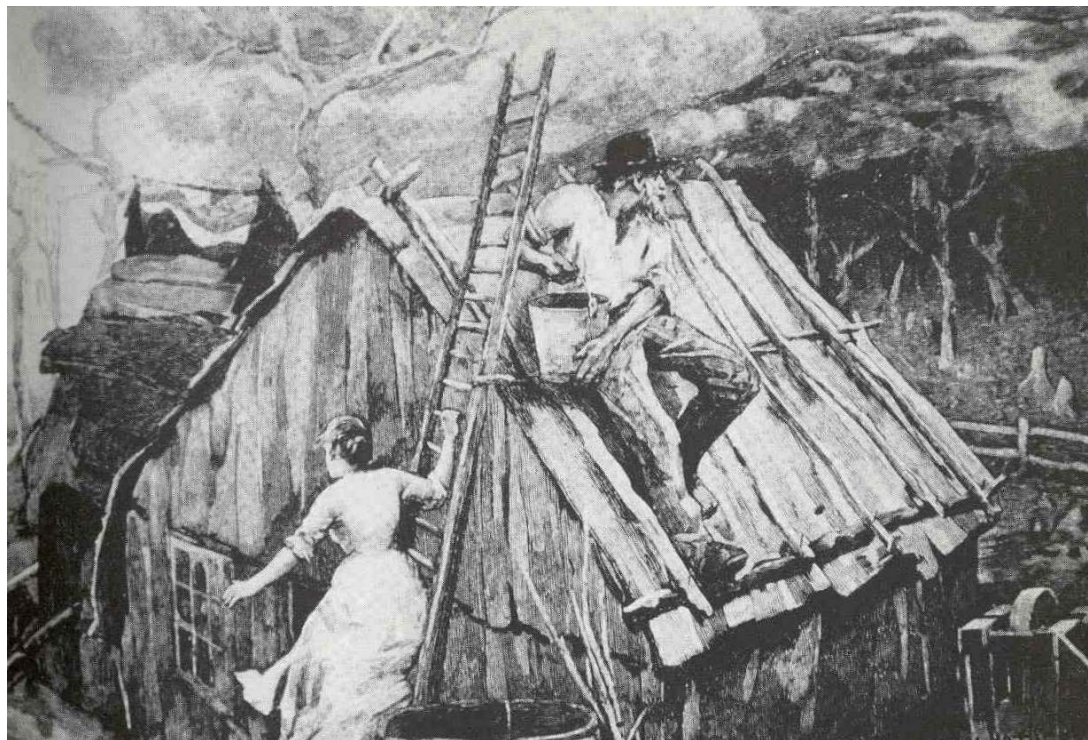


Figure 2: Australian settlers protecting their home from a bushfire. (Pyne, 1991.)

The Red Tuesday fire swept across Gippsland, in Victoria, on February 1, 1898. The fire bore down on settlers, trapping many in their homes or in their attempt to evacuate. Less established settlers, although they had less to lose than the more established farmers and ranchers, found themselves trapped by the burning vegetation scattered across their semi-cleared lands. Ironically, it was the settlers with the least to lose that benefited the most from the horrific flames. The Red Tuesday fire actually hastened settlement by clearing the land for development. Established farmers and ranchers had to work to rebuild, while the less established settlers were farther ahead than they had been before the conflagration.⁷⁹

A combination of folk and rural burning practices spawned the fires that burned in Victoria and the surrounding area on February 14, 1926. European colonists excessively

⁷⁹ Pyne, 1991.

exploited a drier than normal season to burn off the land. Hunters and tourists in the reserve forests allowed billy fires (campfires) to burn out on their own. Black Sunday fires consumed agricultural lands as well as forest reserves, almost two million hectares in all. In response to the damage done to reserve lands, the professional foresters held their first conference in Sydney, resulting in the creation of a continental fire protection strategy.

The Black Friday fires redefined fire protection in Australia. Again, prolonged drought in conjunction with record-shattering temperatures turned the landscape of southeastern Australia into a tinderbox. Lightning ignited a few of the fires, but the main infernos were the creation of casual folk burning traditions. Royal Commissioner, Judge E.B. Stretton of Victoria, used the fires to create standards for fire protection and prevention. Stretton advocated strict regulations on rural landscape burning and fire suppression. Although Stretton's ideas foreshadowed future techniques for fire prevention, it was still several years before Australian fire management instituted any of his standards. Black Friday was the catalyst for modern Australian fire policy, setting the fire scale until 1983.

On February 16, 1983, the Ash Wednesday fires began to burn in southeastern Australia, sweeping through parts of Victoria and New South Wales. Several years of drought had depleted moisture levels in wild land fuels. Anything that *could* create a spark *did* – failed power lines, mechanical sparks from combustion engines, general arson, and so on – to create one of the world's most memorable conflagrations. The winds became increasingly strong, causing fires to spot.⁸⁰ The winds combined with unstable atmospheric pressure and created fire whirls, or tornadoes of fire, which reached heights of 375 meters and spun through the landscape.⁸¹ The

80 Spotting is when sparks or embers produced by a main fire are "carried by the wind and start new fires beyond the zone of direct ignition by the main fire." A spot fire occurs when a fire is "ignited outside the perimeter of the main fire by flying sparks or embers." Source: NIFC, 2004.

81 Pyne, 1991.

fires were almost immediately compared to the fires of Black Friday nearly fifty years earlier. Although the Black Friday fires had consumed more area than had Ash Wednesday, the losses were greater. The 1983 Ash Wednesday fires killed 71 people, devoured almost 2,300 buildings, roasted 350,000 head of livestock, and scorched 350,000 hectares of land.⁸² Folk burning alone did not create the Ash Wednesday conflagrations as it had on Black Friday. Australian fire management had deployed enormous amounts of resources to battle the blaze, resources that were not available in 1939. Nonetheless, fire had reasserted its claim on the landscape, inciting fire management professionals to reassess policy.

4. Early Suppression

United States:

In the early 1900s, Progressive⁸³ thought was taking root in American society, promoting scientific process over traditional practices in everything from agriculture to industry, to economics and politics. At the same time, the foundations for professional forestry were being set. In the spirit of Progressivism, the early leaders of the Forest Service, such as Gifford Pinchot and Henry Graves, insisted that scientifically trained experts administer public lands. The designation of public lands as parks excluded them from settlement, which excluded many sources of fire as well. Science based knowledge replaced folk lore as the main source of understanding of the landscape.

⁸² Pyne, 1991.

⁸³ "In the United States, the Progressive Era was a movement of reform that began in America's cities in the 1890s and lasted through the 1910s. Reformers sought change in labor and fiscal policies in different levels of government; initially it was successful at local level, and then it progressed to state and gradually national... Progressives shared a common belief in the ability of human nature to improve by bettering its living and working conditions." Source: Dictionary.LaborLaw.com, 2005.

The Department of Agriculture's Division of Forestry, the precursor to the Forest Service, came into existence in 1881. The Division's primary mission was information. On March 30, 1891, the first presidential proclamation was signed setting aside public land for forest reserve in the United States. The 1891 proclamation, signed by President Harrison, placed the reserves under the jurisdiction of the General Land Office rather than the Division of Forestry. In 1901 the Division was renamed Bureau of Forestry. The Transfer Act of 1905 established the Forest Service and mandated the organization control over the forests reserves.⁸⁴ President Theodore Roosevelt appointed Gifford Pinchot, former forester for the Biltmore estate forest in North Carolina, as Chief Forester. Pinchot understood that fire was a major factor in the character and diversity of forest growth and he promoted research concerning the “creative action of forest fires” and the ecological regeneration of fire regimes. Eurocentric certainty, however, that fire could be nothing but detrimental quelled Pinchot’s enthusiasm for what would become basic fire ecology almost fifty years later.⁸⁵ The Forest Service became the federal agency in charge of the national forests; it provided funding for research and combined European forestry with American fire policy to create a national system of fire control.

President Wilson created the National Park Service (NPS) with a bill signed into law on August 25, 1916. Efforts to obtain the necessary legislation for establishment of the Park Service had, in fact, been carried on for many years. On February 2, 1912, President Taft sent a message to congress stating, "I earnestly recommend the establishment of a Bureau of National Parks. Such legislation is essential to the proper management of those wondrous manifestations of nature, so startling and so beautiful that everyone recognizes the obligations of the

84 Forest History Society, 2004.

85 Carle, 2002.

Government to preserve them for the edification and recreation of the people."⁸⁶ Prior to the establishment of the NPS, there had been a loose system of national parks and historical monuments managed under various governmental agencies. National parks were the jurisdiction of the Secretary of the Interior, but patrolled and operated by soldiers appointed by the Secretary of War. Military details were necessary in the early days of parks such as Yellowstone (designated the first national park in the United States in 1872) due to a significant amount of highwaymen and bandits who would regularly hold up park visitors. The Antiquities Act of 1906⁸⁷ placed monuments of military significance under the authority of the Secretary of War. Monuments within or adjacent to national forests became the domain of the Department of Agriculture, and the rest became the responsibility of the Department of the Interior.⁸⁸

In 1910, five million acres of forestlands in northern Idaho and Montana burned, killing over eighty firefighters. The same year Henry Graves succeeded Pinchot as Chief Forester. In response to the devastation in the Idaho and Montana mountains, Graves announced that the number one priority of the Forest Service was fire protection, which translated into complete fire suppression. Graves was not terribly receptive to native burning practices or the idea of light burning. The cost of containing the massive conflagrations plunged the Forest Service into debt, causing Congress to honor a 1908 deficit statute. In 1911, the Weeks Act granted the national forestry the ability to purchase land for expansion and provided a budget of \$200,000.00 for fire

86 Civilian Conservation Corps (CCC), 1940.

87 Approved by Congress on June 8, 1906, the Antiquities Act gave the President authority "to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments." Source: CCC, 1940.

88 CCC, 1940.

fighting.⁸⁹ The Act also allowed federal and state cooperatives to collaborate fire control and interstate firefighting.

Appalled at the total suppression policy, cattle and lumber men in the western United States, especially in California, advocated prescribed burning in rural and front country areas, and a let-burn policy in back country forests. Those astute ranchers argued that suppression would increase fuel build up leading to uncontrollable conflagrations. Absolute suppression, they reasoned, was fiscally impossible, and fire exclusion would destroy forests by depriving fire-dependant biota of the flames they needed for regeneration as well as allowing insect populations to multiply unhindered. Private timber owners recognized the benefits of fuel reductions in creating healthy (marketable) stands of trees. Typical fire practices in California included controlled ground fires set on cyclical schedule to clear fuels and prevent major, destructive fires. Controlled burning supporters maintained that a standardization of native and folk fire practices was the responsible and logical policy for fire management.

Even when forest service agents recognized that the landscape was a product of fire, they still did not appreciate the benefits of fire. John B. Leiberg, working for the U.S. Geological Survey, wrote as early as 1902 that the Californian landscape along the northern Sierra Nevada range was, “in almost every state of its condition... determined by the element of fire.” Rather than acknowledging fire as an advantageous tool, he viewed burning as an activity that society must rise above, a menace keeping the land at an imperfect level of production.⁹⁰ In response to the arguments for controlled burning, the Forest Service’s official policy became a combination of rationalized exploitation and conservation of natural resources. Influenced by racial and economic prejudices, Forest Service scientists and foresters believed that fire control in the form

⁸⁹ Carle, 2002.

⁹⁰ Leiberg, U.S. Geological Survey, 1902.

of a European model would make intensive silviculture⁹¹ possible, which would in turn weed fire out of the landscape. With the European model, the landscape could be naturally cultivated to produce optimal timber yields without the stresses of native and folk fire practices. The forest service countered arguments for controlled, light burning⁹² in California with the historic and near mythic imagery of the Big Burn of 1910 in the northern Rockies. In 1923, the California Board of Forestry created a special panel to explore the benefits and disadvantages of controlled burning, which its conclusions officially condemned. Shortly after the panel released its findings, the California Board of Forestry adopted a resolution that excluded light burning practices and favored fire exclusion.⁹³ In the southern United States, however, attitudes toward prescribed burning remained favorable until the 1940s.



Figure 3: California fire prevention notice aimed at light burning advocates, 1913. (Carle, 1992)

91 sil-vi-cul-ture (noun): a branch of forestry dealing with the development and care of forests. Source: Merriam-Webster Online, 2005.

92 Light burning is the burning off of fine, fast-drying fuels, which usually have a high surface area-to-volume ratio. These fuels generally burn easy and fast when dry. Source: NIFC, 2004.

93 Carle, 2002.

The 1910 fires shaped fire research for the next decade. In 1916, the Forest Service established its Branch of Research, which explored new scientific methods through field applications, replacing folklore with pragmatism. Forest Service researchers disputed controlled burning by creating a model for fire management operations that could roughly predict the probability and spread of wild fire, and the resources needed to suppress it. They also promoted the study of fire effects with semi-controlled field experiments and fire patterns evident in the landscape. The politics of management began shaping the landscape rather than the science of forestry.

Congress passed the Clarke-McNary Act in 1924, expanding the Weeks Act and further disseminating federal standards for fire protection among the states. In 1928, the McSweeney-McNary Act strengthened the statutory authorization of fire research by identifying the Forest Service as the official agency and vehicle for such research. Systematic fire policy evolved rapidly, instituting hour control, a standard for response and control of wild fires based on assessed risk and anticipated spread in hourly increments. An economic theory of fire protection also arose, which afforded land higher in economic value more protection than that with low economic value. The comprehensive policy of the Forest Service became “suppression through aggressive initial attack,” especially in rural and front country areas.⁹⁴ The controversy over good and evil of light and prescribed burning, however, would continue well into the 1950s.

The federal government created the Forestry Division of the National Park Service in 1927. Chief Naturalist of the park service, Ansel F. Hall, oversaw the creation of the Forestry Division. Initially Hall’s responsibilities included administrative and educational development of the national parks. With the creation of the Forestry Division, Hall was given the title of Chief

⁹⁴ Carle, 2002.

Forester and the additional responsibility of forest protection planning and administration. The Forestry Division headquarters were located at the University of California, Berkley, where in July of 1928, Congress created the position of Fire Control Expert under the Fire Prevention Plan for National Parks. The Fire Control Expert was responsible for assisting the Chief Forester with forestry and fire prevention issues. John D. Coffman was the first Fire Control Expert. In 1933, New Deal legislation established the Emergency Conservation Work Program for the NPS.⁹⁵

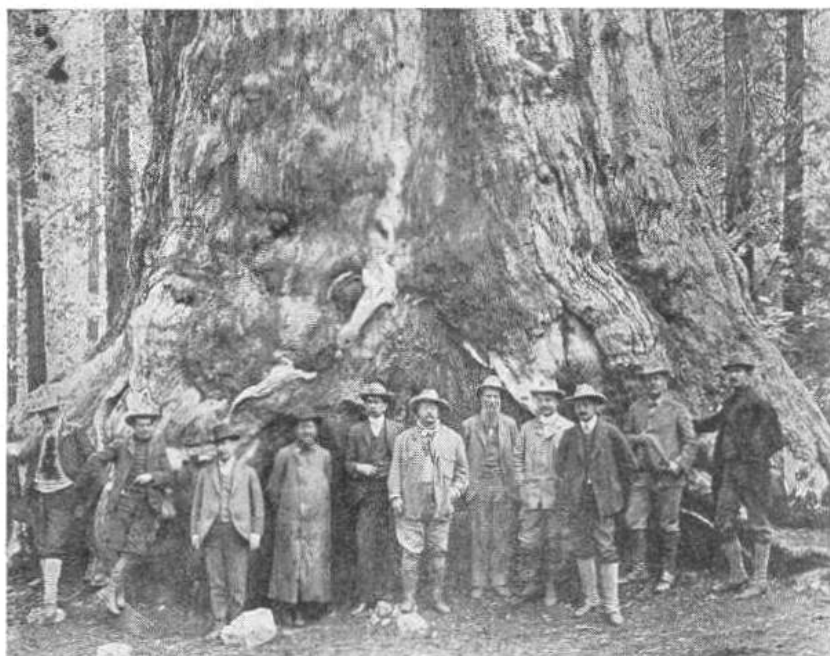


Figure 4: “Distinguished visitors to the Grizzly Giant: On President Roosevelt’s right are Gifford Pinchot and Gov. Pardee [of California]; on his left, John Muir, Benjamin Ide Wheeler, etc. Out of this visit grew the recession of Yosemite Valley and the Mariposa Grove, and their incorporation in the Yosemite National Park.” (Williams, 1914.)

The New Deal presented funding and a labor supply through the Civilian Conservation Corps (CCC) which allowed for the construction of an infrastructure in the national forests capable of supporting the aggressive fire control policy that had arisen from the past twenty

95 CCC, 1940.

years' worth of research and development. In 1935, the Forest Service introduced a national fire-rating index. Based on fire intensity and rate of response, the index became the scale for distribution of fire funds and a general evaluation tool for fire district performance. In 1939, the labor force provided by the CCC lead to the establishment of smokejumpers (for initial fire attack), and forty man fire crews (for campaign fires) in 1939.⁹⁶

In the southern United States, independent fire researchers were shifting emphasis away from the controlled burning controversy in the western part of the country. Growing evidence suggested that light burning in southern pine forests was ecologically valuable, as well as being responsible for the traditional appearance of the landscape. When Forest Service research confirmed these findings, it was quickly suppressed - evidence that contradicted official fire management orthodoxy was a threat to funding, admitting the value of controlled burning jeopardized New Deal alliances. By the end of 1932, however, fire was ripping through drought-ravaged forests. The Forest Service quietly allowed state districts to control burn on protected western lands and still qualify for assistance under the Clarke-McNary Act. By 1943, the organization extended the option to southern forests.⁹⁷

The acceptance of prescribed burning began to waver in the South toward the end of the 1930s. Aggressive fire prevention campaigns along with school programs aimed at elementary school children taught the next generation the ills of fire. H.N. Wheeler was the son of a California preacher and had been a forest supervisor for the Forest Service in California and Colorado and head of public relations at the Denver regional office. In 1923, Wheeler began traveling as the chief lecturer for the Forest Service's fire prevention campaign. Wheeler developed a lecture tour for the South as part of the Cooperative Fire Prevention Campaign in

⁹⁶ Pyne, 1997.

⁹⁷ Pyne, 1995.

1937. Entitled “Forest and Flame in the Bible,” the program incorporated selected Bible passages (approved by representatives from the Protestant, Catholic, and Jewish faiths) with fire prevention propaganda designed to initiate discussion in Sunday school and Bible classes.⁹⁸

As in all aspects of American life during the 1940’s, wartime politics played a major role in fire suppression. America’s involvement in World War II depleted the CCC fire crews, machinery replaced manpower in fire suppression efforts. Defense department propaganda equated forest fire with the Ally enemies and urged patriots to fight fire for freedom. Patriotic fire prevention efforts were not totally without merit. In 1942, a Japanese submarine fired off the coast of southern California, landing shells almost inside of Los Padres National Forest. The same year, the Japanese military made three separate attempts to firebomb the coastal forests of Oregon. Between 1944 and 1945, the Japanese military continued efforts to ignite western coastal forest by launching over 9,000 firebomb balloons into the American bound jet stream.⁹⁹ Images of firebombed cities such as Hiroshima, London, and Berlin mixed with images of wildfires wreaking havoc on American forest reserves. The fight against wildfires resembled the front lines, with strips of bare ground serving as fuel breaks and rapid initial attack. The August 1942 release of Disney’s “Bambi” coincided well with the wartime anti-fire agenda.¹⁰⁰ Instead of taking the lesson of fire ecology, the rejuvenation of the forest at the end of the film, viewers left with images of wildfire devastation vivid in their minds.

98 Cooperative Forest Fire Prevention Campaign, *Forest and Flame in the Bible*, 1961.

99 Carle, 2002.

100 Walt Disney Studios, *Bambi*, 1942.



Figure 5: Bambi and the USFS – This 1944 Forest Service fire prevention poster played on the emotions of Bambi loving Americans. (USFS.)

Smokey Bear was born on August 9, 1944 in the advertising firm of Foote, Cone and Belding located in Los Angeles, California. Over the next sixty years, Smokey would educate the American public, especially American schoolchildren, of the dangers of forest fires and playing with matches. In 1952, the Forest Service smoked plans for an alternative mascot sponsored by Phillip Morris. Johnny the cigarette-toting bellhop just did not have the commercial appeal or the aversion to fire that Smokey did. Every Ideal toy Smokey Bear plush animal sold in 1952 came with an application to become a Junior Forest Ranger. Three years later, there were half of a million Junior Rangers in the United States.¹⁰¹ “Be Careful, because

101 Carle, 2002.

even little fires kill little trees,” was Smokey’s message, further engraining in the American public that all fire, prescribed fire included, was bad, distorting basic fire ecology.”¹⁰² Decades of total fire suppression produced the fuels that fed the 1950 New Mexico inferno necessitating the rescue of the live Smokey the Bear.



Figure 6

The 1950s and the Cold War perpetuated the equation of fire management and suppression with national security. In Alaska, America’s first line of defense against zealous Communists, “rural fire defense” became the responsibility of the United States Office of Civil Defense (OCD).¹⁰³ In 1954, Operation Firestop instituted a relationship between the Forest Service, the California Division of Forestry, and federal civil defense units. Fire management continued to mechanize with surplus military equipment from the Korean Conflict. Government funding for

102 USDA Forest Service, Smokey Bear Fire Prevention Campaign Poster, c.1980.

103 Pyne, 1995.

fire protection, once filtered through New Deal policy, now flowed through the channels of national security. Fire management received fat funding as post-war society reveled in affluence, allowing for mechanized suppression techniques and infrastructure maintenance. Research following World War II emphasized fire behavior and equipment development. The Forest Service established two separate equipment development and training centers – Arcadia, California, which specialized in aircraft, tractors, and engines; and Missoula, Montana, which became the base for smokejumper and hand crew training. The Forest Service first tested air tankers in 1947 over the Northern Rockies. By 1956, air tankers and helitacks (helicopter based fire suppression units) were common management tools.¹⁰⁴ Around this same time, the National Park Service branch of fire protection became the Fire and Aviation Division.



Figure 7: An air tanker dropping fire retardant on a wildfire. (NIFC, 2005.)

104 Pyne, 1995.

There were those in influential positions within the Western fire management profession who were becoming more convinced of the need for light and prescribed burning. Harold Weaver wrote in 1956 about the old growth in ponderosa pine region that had obviously withstood numerous fires to reach the age that it had. After graduating from the Oregon State College forestry program in 1928, Weaver worked with the U.S. Department of Interior's Bureau of Indian Affairs until taking charge of CCC programs in Washington State in 1933. In 1942, he began working with prescribed fires on the Colville reservation. Weaver, however, took care to separate prescribed burning from native burning practices, as the prejudices of forty years earlier were still strong within governmental fire management. Harold Biswell, Forest Service fire researcher and professor of forestry at the University of California, Berkley, was also a strong advocate of prescribed burning.¹⁰⁵ Prescribed burning proponents not only faced animosity from fire management professionals in California, but also the public, conditioned to view any sort of fire as detrimental to forest reserves and other public lands.

By the 1960s, public attitude toward prescribed burning had shifted in favor of fuel and fire hazard reduction. Biswell was able to pursue his research into the Sierra Nevada fire ecology further. The severe 1960 wildfire season in California and other western states strengthened support for prescribed burning. Foresters first used the phrase "fire ecology" in 1962, the year of the first Fire Ecology Conference.¹⁰⁶ The Tall timbers Research Station located in Tallahassee, Florida, sponsored conference. Ed Komarek, who had worked as a researcher for the Forest Service for several years, and his brother, Roy Komarek, founded Tall Timbers in 1958 as an independent fire research station.

¹⁰⁵ Carle, 2002.

¹⁰⁶ Ibid.

The 1964 Wilderness Act mandated the management of National Parks as venues for the preservation of America's primitive landscapes, directly challenging fire control strategy established over the previous thirty years. The Wilderness Act rebuked the use of mechanized fire techniques in the backcountry and called for the introduction of some fire from natural sources, as well as restorative prescribed burning in exploited landscapes. By the late 1960's, evidence for the benefits of prescribed burning had finally forced the Forest Service to revise its policy concerning total fire suppression. Decades of successful suppression had allowed fuel to accumulate to dangerous levels. Within ten years, however, complete suppression policy was reinstated by the Forest Service Branch of Fire Management due to several disastrous fires.¹⁰⁷ The Federal Lands Management Act, passed in 1976, and the Alaska National Interest Lands and Conservation Act of 1980 forced the Forest Service to share its jurisdiction over fire management with the Bureau of Land Management (BLM).¹⁰⁸

As wilderness preservation began to dominate public land use planning, the public began to question the Forest Service's commitment to "wilderness values," costing the Forest Service political influence and leading to a comprehensive alteration in fire policy.¹⁰⁹ The Forest Service's dominance of national fire management rapidly tumbled. Individual federal agencies sought to create their own branches of fire management as it became obvious no single policy or organization could oversee all fire needs. A joint venture between the Forest Service and the BLM established the National Interagency Fire Center (NIFC) in Boise, Idaho in 1969, for the coordination of interregional (and eventually international) firefighting efforts. The National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service joined the NIFC in the

107 Pyne, 1997.

108 Ibid.

109 Pyne, 1995.

1970s. In 1974, the creation of the United States Fire Administration and Center for Fire Research, created under the jurisdiction of the National Bureau of Standards, shifted the focus of fire policy from wildlands to urban fire concerns and broke fire managements ties to the OCD.

Australia:

The Australian codependence on fire kept fuel levels on reserve lands at a manageable level. With the cessation of aboriginal fire practices, tropical rain forest began to fill in grasslands. Burning by European settlers destroyed the habitat of certain biota, created over centuries by Aboriginal fire regimes.¹¹⁰ As Australia developed into a modern country, land management through fire began to reflect economic and cultural factors. As a new Australian society unfolded, the cultural value of the native environment became apparent. The intellectual force of European colonization had confronted bush fires with European fire applications. Fire practice that emerged from European settlements in Australia, however, was not European in character. As settlers adopted the aboriginal traditions, it became apparent that they would not remake the Australian landscape into Britain.

Early fire management ignored the fact that fire defined Australia, and even more, fire defined what it meant to be Australian. Fire is not merely a tool in the outback; it is life in the outback, “the billy fire, not the hearth fire, was the symbol of settlement.”¹¹¹ European styled fire policy of the nineteenth and early twentieth century was slow to understand this in its attempt to flush fire from the continent. The 1847 Bush Fire Ordinance sanctioned flogging for any minors or aboriginal Australians caught igniting bush fires.¹¹² Fire suppression ordinances

110 Bowman, *New Phytologist*, November 1998.

111 Pyne, 1995.

112 Bowman, *New Phytologist*, November 1998.

lead to a major increase in built up fuels, which resulted in greater frequency of disastrous bush fires.

The 1851 Black Tuesday fire set the foundations for fire suppression not only in Victoria, but also in most of Australia. Black Tuesday burned a quarter of the state; however, it was not until 1897 with the creation Royal Commission that there was a government agency responsible for monitoring Victoria's forest resources. The Royal Commission's main priority was fire protection, but the commission did recognize that the forest biota had adapted to native fire regimes, and also predicted that major bush fires would continue as long as there were rural and wild landscapes in Australia. The commission recommended fire use restrictions during the summer months along with a fuel reduction program and strict penalties for noncompliance. However, the state government at the time did not implement these recommendations. The State Forests Department, established in 1907 to manage the state's forests, became the Department of Sustainability and Environment (DSE). By 1920 the main objective of the State Forests Department was to convince rural inhabitants that "wanton or grossly careless fire raising" was not appropriate nor in the best interest of the landscape.¹¹³ The prevailing attitude toward landscape fire, however, remained less than favorable.

Not until after the Black Friday fires and World War II did fire policy begin to reflect the uniqueness of the Australian bush fire. In 1947, the Fire Services Act nationalized fire protection in Australia by building on the British wartime fire services. Fire management professionals began to realize that fire was not only an environmental necessity, but also a distinctive feature in the social identity of the country. The fresh acceptance of fire identity soon came into conflict with other emerging cultural values. As Australians set out to redefine their

¹¹³ State of Victoria, Department of Sustainability and Environment (DSE), 2005.

identity through the landscape, they first had to preserve the landscape in a native state, which meant returning it to pre-European condition as nearly as possible. The government began converting almost all public lands into nature parks and preserves, and into Aboriginal reserves. By doing so, the government took the responsibility of fire management from the foresters and bush fire brigades who had developed and fine-tuned the Australian strategy and again restructured fire management in Australia.

The Australian Strategy employed comprehensive burning for fuel reduction. Strip firing protected agricultural fields. Forest, grazing, and recreation areas were managed with blanket burns. Postwar science and fervent ideology induced by the 1939 fires restructured traditional folk burning into regulatory policy. After the Black Friday fires in 1939, the Australian government passed the Forest Act provision, enabling state forest commissions to take complete control of fire suppression on public lands. The 1940s also saw the construction of fire towers and roads into millions of acres of public lands that were inaccessible before Black Friday.¹¹⁴

Some conservation groups grounded in the European school of fire management wanted to suppress burns all together. These groups made no distinction between the prescribed burning of the Australian Strategy and the slash and burn folk tradition – to them bush fire was undignified and not appropriate in the proper garden model of a preserve.¹¹⁵ Other groups were more favorable of fire and accepted that fire played a crucial role in the landscape, but not favorable of blanket burning to reduce fuels. These groups advocated a mixture of fire adjusted to season and ecosystem, which would insure a broad biodiversity.

The Australian Strategy was logical, but pragmatically it could never effectively reduce fuel accumulations enough to prevent another Black Friday. “The confusion over practices...

114 State of Victoria, DSE, 2005.

115 Pyne, 1991.

only reflects what Australia should be and how it should be understood” – the aboriginal Australians had over 40,000 years to develop a mode of living through fire in the landscape.¹¹⁶ The Europeans, in their two centuries, had little collective knowledge in comparison with which to manipulate the landscape. The controversy over fire policy not only exposed not only exposed the discombobulation of Australian fire policy, but the “inadequacy of Australia’s cultural resources.”¹¹⁷

In 1965, Australian foresters developed combustible capsules, carried by light aircraft and dropped into remote locations to produce wholesale fires. The entire land mass could now be managed with comprehensive burning. Advocates of the device equated it with a newly emerging Australian nationalism. While North American fire management sought to fight fire with water, Australians accepted the burning landscape as their heritage. Even today, fire management professionals in Australia often execute prescribed burns in remote areas with incendiary capsule dropped from low flying aircraft.¹¹⁸

In the late 1980s, the attitude of white, urban Australians toward landscape fires was far different from that of European colonists 100 years earlier. While cattle ranchers still maintained a regime of pastoral burning, and aboriginal Australians set thousands of bush fires (to clean up the landscape) annually, the general public consensus was that improved vegetation cover was dependant on decreased burning. Ranchers, although their burning practices essentially created the same results as those of the aboriginal Australians, remained skeptical of aboriginal fire regimes. In Victoria, the general public believed that landscape burning was a greater threat than were conflagrations. In the Northern Territory, townspeople believed that all fire was

116 Pyne, 1995.

117 Ibid.

118 Rossotti, 1993.

“inherently destructive,” further demonstrating the separation of fire from everyday life, and the negative imagery associated with it.¹¹⁹

The Australian National Parks and Wildlife Service (ANPWS) is less reluctant now about using fire as a management tool than they were even twenty years ago. In the early 1980s, the ANPWS attempted to prevent fires within roadside view sheds, as burnt landscape was not a big draw for visitors. ANPWS fire management regulated prescribed burns and other fires to tall, open forest areas and eucalyptus woodlands, avoiding fragile habitats such as monsoon forests or paper bark swamps. The exclusion of fragile habitats was similar to the exclusion of those habitats in Aboriginal regimes, but ANPWS policy was not exclusive to fire practices described by Aborigine park informants. In Kakadu National Park, experience and knowledge tended to vary greatly from individual to individual concerning burning practices and fire ecology. Despite training in fire application, most park personnel educated in a European model of forestry maintained the belief that fire is innately destructive. As is generally true of urban and industrial cultures, the overall ANPWS staff opinion was that scientific knowledge was superior to indigenous knowledge of landscape burning, and aboriginal Australian fire practices were haphazard and unorganized.¹²⁰

119 Lewis, *American Anthropologist*, December 1998.

120 Ibid.

CHAPTER 3 – CURRENT POLICY

1. Resource Types

Yosemite National Park, United States:

Yosemite National Park, located in the Sierra Nevada Mountains was set aside as a national park in 1890. The park harbors a collection of natural wonders including spectacular waterfalls and groves of giant sequoias. As one of the oldest national parks in the United States, Yosemite is unique not only for its natural resources, but also for its history as a national park. President Lincoln signed a bill granting Yosemite Valley and the Mariposa Grove to the State of California as a public trust on June 30, 1864. The creation of the Yosemite Valley and Mariposa Grove land trust by the United States government marked the first time in history that public lands were been preserved purely for the enjoyment of the general population. On October 1, 1890, Yosemite was designated a national park by the federal government, with the addition of the sub-alpine meadows surrounding Yosemite Valley.¹²¹ The State of California maintained authority of the original reserved lands until 1906 when it relinquished control to the federal government.¹²²

Historic resources in Yosemite National Park include natural and historic landscapes formed by pre-historic and historic activities of Native and European Americans. Trail systems, and travel corridors from the late nineteenth and early twentieth century wind throughout the park. Some trails were hunting and trade trails, while others were part of the early tourism

¹²¹ National Park Service(NPS), Yosemite National Park, 2005.

¹²² Dilsaver; Rowman & Littlefield, 1994.

network operating in the park just after the turn of the twentieth century. Built structures remain from military occupation as well as early tourism in the park.

All major forest and chaparral plant communities in Yosemite have evolved under the influence of periodic fires, and many plants have developed adaptations to a regime of frequently occurring fires. Some plants are dependent upon fire for successful reproduction. Unfortunately, decades of fire suppression have altered park vegetation and wildlife habitat. The restoration of fire to its natural role in park ecosystems is one of the highest priorities in the natural resource management of Yosemite National Park.¹²³



Ready for the Trails.

Figure 8: Early tourists in Yosemite. (Williams, 1914)

¹²³ Final Yosemite Fire Management Plan., Environmental Impact Statement (EIS), 2004.

Kakadu National Park, Australia:

For nearly the last 40,000 years, aboriginal fire regimes have burned the landscape of Northern Australia, much like the majority of the landscape in Australia. In the last 100 years, European pastoralists and cattle ranchers have added their own set of regimes to the landscape. Aboriginal Australians feel that fire is “an important humanizing force in landscapes, and remain distressed by prohibitions on starting landscape fires.”¹²⁴ Aboriginal Australians are also concerned about the loss of traditional knowledge of the landscape and of fire. In areas where European colonization has been extensive, intangible resources relating to the landscapes are being lost as well.

Evidence of aboriginal habitation in Kakadu National Park is abundant in the park, especially in the extensive number of aboriginal archaeological sites. Aboriginal Australian rock paintings in Kakadu depict animals that are now extinct on the Australian mainland. Archaeologists have found a wide range of Aboriginal artifacts at sites throughout the Park, especially in the escarpment and floodplain country. Radiocarbon dating of material from some of these sites has revealed an occupation date of between 20,000 and 25,000 years. The international preservation community recognizes the park as a World Heritage Site for the layers of cultural heritage inherent there.¹²⁵

124 Bowman, *New Phytologist*, November 1998.

125 Australian Government, Department of Environment and Heritage, Kakadu National Park, 2005.

2. Jurisdiction

United States:

The National Interagency Fire Center, in Boise, Idaho, houses the Branch of Fire and Aviation of the National Park Service. Fire and Aviation works with cooperating agencies, also coordinated by the NIFC, such as the United States Forest Service, the Bureau of Land Management, and the Bureau of Indian Affairs. Cooperation between these agencies is essential as the boundaries between various types of public lands are adjacent and are generally not a deterrent to wildfire. The NIFC coordinates fire management efforts between various land management agencies. Although the NPS collaborates on fire management efforts with the BIA, fire management within national parks is strictly the jurisdiction of the NPS Branch of Fire and Aviation. Likewise, fire management on Native American lands is the sovereignty of the BIA. Collaboration generally encompasses the development of management plans where the importance of cultural resources supercedes the interests of more than one agency or during wildfire seasons when fire-fighting resources are pooled to contain conflagrations. Fire ecology in the United States has developed as an individual science since the Progressive Era, replacing native and folk knowledge of fire regimes.

Australia:

In the 1990s, legal recognition of original occupation of Australia by aboriginal groups created legal debate over the deliberate modification of native landscapes with fire. This legal recognition extends aboriginal rights into fire management of several national parks.¹²⁶

In Kakadu National Park, located in Australia's Northern Territory, the ANWPS has recognized the importance of aboriginal fire regimes in managing and maintaining the

¹²⁶ Bowman, *New Phytologist*, November 1998.

landscapes of the park. Park policy written in the 1980s calls for “elements of traditional uses of fire... to reestablish, so far as possible, the traditional aboriginal patterns of burning” by seeking the “cooperation, advice and participation of aboriginals living in the park.”¹²⁷ The aboriginal Australians consider managing the landscape with fire as a responsibility - a responsibility owed not only to their elders and ancestors, but to the land as well. Individuals who use fire as a landscape management tool are accountable to those in the group who bear more knowledge about fire behavior and regimes and must answer for miscalculations in burning certain areas.¹²⁸

The Environment Protection and Biodiversity Conservation Act of 1999 created the park, managed through a joint arrangement between the aboriginal Australian traditional owners and the Director of National Parks. The Director manages Commonwealth national parks through Parks Australia, which is a part of the Department of the Environment and Heritage. Approximately 50% of the land in the park is aboriginal Australian land under the Northern Territory Aboriginal Land Rights Act 1976. Most the remaining area of land is under claim by Aboriginal people. Aboriginal land trusts hold the title to Aboriginal land in the park. The land trusts have leased their land to the Director of National Parks for the purpose of a national.¹²⁹

3. Current Policy

In areas where “folk burning is ubiquitous, fire exclusion means the exclusion of folkways, a reformation quite beyond the power of any fire establishment.” It also results in a deliberate and conscience change in the landscape.¹³⁰ Areas where folk burning prevails generally lack the environmental conditions that create fires with cultural impact. Rural and

127 ANPWS. Kakadu National Park, 1980. See also: ANPWS. Kakadu National Park: 1986.

128 Lewis, *American Anthropologist*, December 1998.

129 Australian Government, Department of Environment and Heritage, Kakadu National Park, 2005.

130 Pyne, 1995.

wildland fuels, unlike urban fuels, which consist mainly of natural and synthetic construction materials, are extremely similar to one another, consisting mostly of organic cellulose. Fire modeling for rural and wildland fires has been much less successful than for urban fire due to greater possibilities in variation of environmental conditions, directly effecting fuel flammability. The speed with which forest fire travels is dependant on the amount of fuel available and the flammability of that fuel. Fire will generally travel along the surface of the ground through the litter layer of twigs, leaves, and pine needles, just above the duff.¹³¹ The removal of surface fuels to create firebreaks can restrict surface fires to certain areas.¹³²

As fire travels across the floor of the forest, it is possible for the flames to ignite mid-level brush. From this mid-level brush, the fire may climb into the forest canopy creating a crown fire.¹³³ Crown fires destroy mature growth and leave forests and landscapes devastated. Usually a break of 100 meters in the upper foliage is enough to stop a crown fire.¹³⁴ Regular prescribed burns, keeping fuel levels low, also help to avoid crown fires. Trained fire professionals should carry out prescribed burns on public lands under optimal weather conditions.

Unpredictable changes in the weather, especially in wind patterns, make wildfire modeling extremely difficult. Not only do environmental conditions unrelated to the fire affect wind patterns, but convection currents created by the fire itself may also create winds unfavorable to the containment of wildfire. Rain, obviously, can slow a fire, but unless it is in

131 Duff is the “layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil.” Once the duff ignites, it is extremely difficult to extinguish and may smolder for days or even weeks. Source: NIFC, 2005. See Also: Rossotti, 1993.

132 Rossotti, 1993.

133 A crown fire, or crowning, is the “movement of a fire through the crowns of trees or shrubs more or less independently of the surface fire.” Source: NIFC, 2005. See Also: Rossotti, 1993.

134 Rossotti, 1993.

the form of a substantial downpour much of the extinguishing capabilities are lost to steam. In hot and particularly in arid climates, sunlight can intensify wildfire by preheating fuels. Extreme fire damage can result in soil erosion due to the lack of vegetation to absorb rain, further altering the landscape.¹³⁵



Figure 9: A crown fire in the Northern Rockies. (Carle, 1992.)

Accurate assessment of prescribed fire effects on cultural resources is not always easy to obtain. Certain resources, specifically buried archaeological elements, may react to fire so minutely that it is nearly impossible to detect. Subsurface heating combines several variables, including moisture content in the soil and duff layers, fuel distribution, weather conditions, and the accumulation of organic litter. While little is known about how surface fire intensity affects soil temperatures, it appears that high surface fire temperatures have very little effect on

¹³⁵ Rossotti, 1993.

subsurface temperatures.¹³⁶ Prescribed burn preparations for pre-historic and historic structures include the construction of fire lines, the modification of burn and staging area boundaries, and the manual removal of fuels from around the site.¹³⁷

United States:

After the intense fire season of 1994, a joint task force consisting of representatives from the NPS, USFS, BIA, BLM, and Fish and Wildlife Service (FWS), met to review the federal wildland fire-management policy. The final task force report led to the NPS Director's Order No. 18 on Wildland Fire Management, which remains in effect until December 31, 2005.¹³⁸ The current Wildland Fire Management Policy designates the protection of human life as the number one priority of wild fire management. Natural and cultural resources are the second. The policy also addresses the reintroduction of fire into the landscape through prescribed burns. Areas where hazardous fuel buildup prevents the safe initiation of prescribed burns should be pretreated by manually removing fuels or digging fire breaks; this is especially critical in wildland / urban interface areas and where fire sensitive resources are in danger of burning.¹³⁹

In most national parks, fire management personnel use prescribed fire to manage vegetation instead of lightning-caused fires. Fire management personnel may also closely monitor naturally started fires, ignited by lightning or lava, to meet specific resource objectives like the prescribed fires. Some parks have areas designated as Natural Fire Zone in which fire staff closely monitor natural ignitions, allowing them to burn as a natural process without

136 Hanes, *Fire Effects Guide*, 2001.

137 Ibid.

138 Gleeson and Jones, CRM. 2000.

139 NPS, Director's Order #18, 2003.

intervention. In remote, backcountry areas of western parks, the park service allows many lightning-caused fires to burn and die naturally each year.¹⁴⁰

Fire management professionals with drip torches¹⁴¹ ignite prescribed burns along pre-designated firebreaks. Fuels can be reduced by mechanical, chemical, biological, and manual methods. The most cost effective reduction of fuel hazards implements a combination of fuel reduction techniques, addressing both resources and land use activities. The management of landscape health requires the cooperative efforts of various agencies, as well as public education. Public education should focus on the environmental, social, and economic benefits of prescribed fire. Prescribed fire is very high-risk activity due to the potential for “unintended consequences” and because the “stigma . . . [upon] an escaped prescribed fire does not distinguish between poor performance and an unfortunate consequence of unplanned events.”¹⁴² Land management agencies and fire professionals use prescribed fire to accomplish a variety of resource management objectives. Outside of the southern United States, however, public land managers rarely use fire to improve ecosystem health or for the reduction of fuel hazards on a landscape-wide scale. Generally speaking, land management agencies recognize the natural role of fire in the landscape, but not all “individual disciplines or managers fully understand or support this role.”¹⁴³

Prescribed burning by land management agencies can promote the growth of certain flora for use by Native Americans as food, medicine, or in the manufacturing of traditional crafts. The USFS has used prescribed burning in certain areas of California to promote the growth of a

140 NPS Fire and Aviation Management, 2005.

141 A drip torch is a “hand-held device for igniting fires by dripping flaming liquid fuel onto the materials or area to be burned; consists of a fuel fount, burner arm, and igniter. The fuel used is generally a mixture of diesel and gasoline.” Source: NIFC, 2005.

142 United States Forest Service (USFS), 2004.

143 USFS, 2004.

specific plant, which the Yurok tribe uses in traditional weaving. Low intensity fires used in prescribed burns will not damage the trunks and needles of mature trees, and will enrich soils. The efforts of the USFS have spurred the revitalization of certain areas of traditional Yurok culture.¹⁴⁴



Figure 10: A fire fighter setting a prescribed burn with a drip torch. (NIFC, 2005.)

In 1999, the NIFC convened an interdepartmental group of cultural resource specialists from agencies housed within the cooperative of the NIFC, to draft a Section 106 Problematic Agreement (PA) to address fire protection of cultural resources. The Section 106 PA integrates several existing guidelines from the National Conference of State Historic Preservation Offices (NCSHPO), the Advisory Council on Historic Preservation (ACHP), and the National Historic Preservation Act to create a uniform standard for fire management policy and application to cultural resources. The Section 106 PA also instituted training programs for cultural resource specialist and fire management professionals to educate both disciplines on the objectives of fire

¹⁴⁴ Hanes, *Fire Effects Guide*, 2001.

management as it pertains to cultural resources. The Burned Area Emergency Rehabilitation (BAER) planning teams consist of a collection of environmental, fire management, and cultural resource specialists to monitor fire and suppression effects on natural and cultural resources, and to recommend less damaging techniques for fire suppression.¹⁴⁵

Australia:

Topography, weather, and fuel load determine the behavior of fire in the landscape. Fuel is the only element that is easily modified prior to a wildfire. General fire management policy in Australia, as in the United States, includes the reduction of fuels through mowing, raking, slashing and burning. Burning, for obvious reasons, is the most effective in reducing fuel loads over large areas. Prescribed burning allows for the removal of highly flammable fuels from the landscape in a controlled effort. Removal of these fuels causes wildfires to burn with less intensity and at a slower rate than they would feeding from stockpiled fuels.¹⁴⁶ In rain forests and similar topical ecologies, which are neither adapted nor dependent on fire regimes, prescribed burning for fuel reduction is not an option.¹⁴⁷ Recognition of aboriginal Australian customs has allowed for the reintroduction of traditional Aboriginal burning practices into Australia's national parks and reserves. Traditional European fire suppression techniques are nearly identical to those of the United States.

Traditional aboriginal Australian fire practices involve selective burning and withholding fire during various times of the day and year. Aboriginal Australian groups, native to Kakadu National Park schedule prescribed burns according to specific characteristics of a certain area based on a seasonal, cultural calendar that passed down by oral traditions. Aboriginal

145 Gleeson and Jones, CRM. 2000.

146 State of Victoria, DSE, 2005.

147 Ibid.

Australians light fires under windy conditions of midday so that they may control the fire with the knowledge of daily and seasonal wind patterns. Aborigines believe that a country “dirty with rank grass, thick leaf litter, or a tangled undergrowth” is neglected.¹⁴⁸ When an aboriginal Australian enters an area that is uncared for, he or she considers it his or her personal responsibility to the landscape and to society to clean the place up with a corrective fire, regardless of the time of year, as the further neglect will only make matters worse. These sorts of corrective fires, when lit late in the dry season, seem to European ANPWS staff to be the work of haphazard firebugs. Aboriginal Australians are aware of the risks involved in late season burning, but also aware that allowing the fuels to continue to stockpile is a far more dangerous situation. The less often that remote areas are visited, the more fuels accumulate, making corrective burning all the more critical when those areas are visited. Aboriginal Australians believe that problem with fire suppression is not late season fires, but too few fires early in the season. They also consider the ANPWS approach toward burning to be far too wary.

¹⁴⁸ Lewis, *American Anthropologist*, December 1998.

CHAPTER 4 – CONCLUSION

Prescribed burning and fuel hazard reduction has become standard policy for both United States and Australian fire management agencies. The reintroduction of fire into the landscape has revived ecosystems as well as redefined landscape patterns nearly lost due to fire suppression. Both countries have also continued a let-burn policy for backcountry and remote park areas. Fire management and park service agencies have developed specific policies to address fire management of archaeological, prehistoric and historic structural resources, with consideration to historic preservation acts. In the United States, national and regional resource management agencies have created programs to teach cultural resource specialists and fire management professionals the objectives of each other's discipline.

Forest Service and National Park Service policy is respectful of traditional Native American rights and uses of the landscape, but traditional Native American fire practices have become lost. The rapid decimation of Native American culture, coupled with the conflagrations around the turn of the twentieth century and scientific pragmatism, created an atmosphere that smothered native and folk knowledge of landscape burning. Forest and park service policy in the United States and in Australia effectively removed Native Americans and aboriginal Australians from fire management and policy planning of the landscapes that their ancestors created. Decades of fire exclusion by park and forestry policies has led to the loss of native and folk knowledge of landscape burning. At the close of the twentieth century, European-trained foresters have begun to appreciate the value of native burning practices; in spite of this, the

knowledge of these practices has almost disappeared. In Australia, the Australian Government and Aboriginal tribes jointly manage several parks, reaffirming the cultural knowledge of the landscape. In the United States, however, not managing the land with fire has prevented flow of cultural knowledge between generations. Soon no one will remember the old ways of burning the landscape, and that intangible resource will be gone.

Fire regimes in the western United States, while not to the scale of Australian fire regimes, reasserted themselves violently in the last part of the twentieth century. Encroachment of urban areas into wildlands has created new issues concerning fire management and burning control. The landscape will continue to reassert its need for fire, and the new rural and urban dwellers must relearn how to manage landscape fire.

Fire in Australia is such that neither the reduction of fire to the satisfaction of fire management politics nor a management plan that encompasses the Australian landscape are currently feasible. Over a century of widespread conflagrations are proof that large-scale fire is integral to the Australian landscape. Australian national temperament has been to let fire burn – the small ones are too small to be concerned with and the large ones are hopelessly insurmountable. In specific locations, however, it is possible to protect individual dwellings, farms, and public reserve lands from fire. To rid large-scale fires from the landscape and cultural politics of Australia would require the complete decimation of the exclusive natural and cultural landscape that defines Australia. By protecting large wild land areas as cultural resources, the potential for large wild land fires is always present.

Fire remains indispensable. It is an ever-present, if indirect, force in our landscapes, whether natural or man-made, rural or urban. The shape that fire lends to our cultural landscapes is reflective of our culture itself. Native Americans and aboriginal Australians universally used

fire to manipulate and manage the landscape, creating the landscapes sub-sequentially colonized by Europeans.

The natural landscapes of national parks around the world are ethnographic and cultural landscapes modified with fire by native hunter and gatherer groups. European colonists and early forestry professionals perceived these landscapes, formed by thousands of years of aboriginal fire regimes, as natural phenomenon. The advent of twentieth century fire suppression techniques has compromised the health and character of these landscapes. European-based forestry, both in the United States and in Australia, has suppressed not only the knowledge of fire in the landscape, but the cultural knowledge of fire as well. Over eighty years of fire suppression has nearly destroyed ancient fire regimes, threatening the preservation of the cultural as well as the natural landscape.

While both the NPS and the ANPWS have reintroduced prescribed and wildfire burning into the park landscape, the reintroduction of traditional burning has been slow if at all. In order to maintain the cultural landscape present in national parks, landscape management officials must use low intensity prescribed fires much more aggressively than they have in the recent past. The park service, to fully implement more effective burning practices, must also implement an aggressive public education campaign that will not produce a country of arsonists. This will counteract a century's worth of brilliant fire prevention propaganda. For fire to fulfill its role in the landscape, the average citizen must feel comfortable taking back control of the divine flame.

REFERENCES

- Australian Government, Department of Environment and Heritage. Kakadu National Park. *Management of Kakadu National Park*. 31 January 2005. Available: <http://www.deh.gov.au/parks/kakadu/parkjointmang/index.html>. Accessed 26 February 2005.
- ANPWS. *Kakadu National Park: Plan of Management*. Canberra: Commonwealth of Australia, 1980.
- ANPWS. *Kakadu National Park: Plan of Management*. Canberra: Commonwealth of Australia, 1986.
- Birnbaum, Charles A., ASLA. *Protecting Cultural Landscapes: Planning, Treatment and Management of Historical Landscapes*. Preservation Brief 36, Technical Preservation Services. United States Department of the interior, National Park Service. Available: <http://www.cr.nps.gov/hps/tps/briefs/brief36.htm>. Accessed 11 February 2005.
- Bowman, M.M.J.S.. "Tansley Review No. 101: The Impact of Aboriginal Landscape Burning on the Australian Biota." *New Phytologist*. vol.140, no.3 (November 1998): 385-410.
- Carle, David. *Burning Questions: America's Fight with Nature's Fire*. Westport: Praeger, 2002.
- Civilian Conservation Corps (CCC). *A Brief History of the National Park Service*. United States Department of the Interior, 1940. Available: http://www.cr.nps.gov/history/online_books/kieley/index.htm. Accessed 12 March 2005.
- Cooperative Forest Fire Prevention Campaign. *Forest and Flame in the Bible*. U.S. Advertising Council, State Foresters, and USDA Forest Service. Reprinted December 1961.
- Dictionary.LaborLaw.com. *Progressive Era, United States*. Available: http://encyclopedia.laborlawtalk.com/Progressive_Era. Accessed 10 March 2005.
- Dilsaver, Lary M. (editor). *America's National Park System: The Critical Documents*. Rowman & Littlefield, 1994. Available: http://www.cr.nps.gov/history/online_books/anps/index.htm. Accessed 12 March 2005.
- Final Yosemite Fire Management Plan. Environmental Impact Statement. March 2004. Available: <http://www.nps.gov/yose/planning/fire/index.htm>. Accessed 14 January 2005.
- Forest History Society. *U.S Forest Service History: Agency Organization*. 01 November 2004. Available: http://www.lib.duke.edu/forest/Research/usfscoll/policy/Agency_Organization/index.html. Accessed: 24 February 2005.

Conarro, R.M. "Fighting Tomorrow's Fires Today," *American Forests* (April 1939): 214.

Gleeson, Paul, and A. Trinkle Jones. "Cultural Resource Protection and Federal Fire Management Issues." *CRM*. vol.23, no.6 (2000): 20-22.

Goudsblom, Johan. *Fire and Civilization*. Allen Lane: The Penguin Press, 1992.

Hanes, Dr. Richard C. "Chapter VIII: Cultural Resources." *Fire Effects Guide*. National Wildfire Coordinating Group, 31 May 2001. Available:
http://fire.fws.gov/ifcc/monitor/EFGUIDE/cultural_resources.htm. Accessed 11 October 2004.

Holbrook, Stewart H. *Burning an Empire*. New York: Macmillan, 1943.

Jones, Rhys. "Fire-stick Farming." *Australian Natural History*. no.16 (1969):224-228

Kuhlken, Robert. "Settin the Woods on Fire: Rural Incendiarism as Protest." *Geographical Review*. vol.89, no. 3 (July 1999): 343-363.

Leiberg, John B. *Forest Conditions in the Northern Sierra Nevada, California*. Department of the Interior, U.S. Geological Survey, Professional Paper No. 8. Washington, D.C.: Government Printing Office, 1902.

Lewis, Henry T. "Ecological and Technological Knowledge of Fire: Aborigines Versus Park Rangers in Northern Australia." *American Anthropologist*, New Series. vol. 91, no. 4 (December 1988): 940-961.

Lewis, Henry T. and Theresa Ferguson. "Yards, Corridors, and Mosaics: How to Burn a Boreal Forest" *Human Ecology*. 16 (1988): 57-77.

Lyons, John W. *Fire*. New York: Scientific American Library, 1985.

Merriam-Webster Online. Available: <http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=biota>. Accessed 12 February 2005.

National Interagency Fire Center. *Glossary of Wildfire Terms*. Available:
<http://www.nifc.gov/fireinfo/glossary.html#P>. Accessed 23 October 2004.

National Park Service. Director's Order #18: *Wildland Fire Management*. United State Department of the Interior, 31 December 2003.

Page, Michael, and Robert Ingpen. *The Encyclopedia of Things that Never Were*. New York: Penguin Studio, 1985.

Pyne, Stephen J. *America's Fires: Management on Wildlands and Forests*. Durham: Forest History Society, 1997.

Pyne, Stephen J. "Attention! All Keepers of the Flame" *Whole Earth* (Winter 1999). Available: <http://www.wholeearthmag.com/ArticleBin/290.html>. Accessed 18 January 2005.

Pyne, Stephen J. *Burning Bush: A Fire History of Australia*. New York: Henry Holt, 1991.

Pyne, Stephen J. *Fire: A Brief History*. Seattle: University of Washington Press, 2001.

Pyne, Stephen J. *Fire in America: A Cultural History of Wildland and Rural Fire*. Seattle: University of Washington Press, 1982.

Pyne, Stephen J. "Firestick History" *The Journal of American History*. vol.76, no.4 (March 1990): 1132-1141.

Pyne, Stephen J. *World Fire: The Culture of Fire on Earth*. New York: Henry Holt, 1995.

Rosen, Christine Meisner. *The Limits of Power: Great Fires and the Process of City Growth in America*. Cambridge: Cambridge University Press, 1986.

Rossotti, Hazel. *Fire*. Oxford: Oxford Press, 1993.

Smith, Jim. *Protecting Archaeological Sites with Prescribed Fire*. California Department of Forestry and Fire Protection: Fresno, California, 1999. Available: http://www.indiana.edu/~e427/cdf/fire/fire_protect.html. Accessed 11 October 2004.

State of Victoria, Department of Sustainability and Environment. *History of Fire Management on Public Lands*. 1996-2004. Available: <http://www.dse.vic.gov.au/dse/nrenfoe.nsf/childdocs/-7831E979B38627F2CA256DA6000E2E4C-34958DD9CA4136E6CA256DA9001C7AAE?open>. Accessed 01 February 2005.

State of Victoria, Department of Sustainability and Environment. *Using Fire to Manage Our Parks and Forests*. 06 April 2004. Available: <http://www.dse.vic.gov.au/dse/nrenfoe.nsf/childdocs/-A33AA7D81F96F3114A2567CB000DB43A-1C0CF21706909C04CA256DAC00169D3B-5EDCE94D4AD3D6E54A256DEA0013E4B6-765848024298CE4D4A25683F00087398?open>. Accessed 01 February 2005.

NPS Fire and Aviation Management. *Prescribed Fire*. United States Department of the Interior. Available: http://www.nps.gov/fire/fire/fir_prescribedfire.html. Accessed 10 March 2005.

United States Forest Service. Federal Wildland Fire Policy: Use of Wildland Fires. Available: <http://www.fs.fed.us/land.wdfire7a.htm>. Accessed 11 October 2004.

National Park Service. *Yosemite National Park: History*. United States Department of the Interior. Available: <http://www.nps.gov/yose/nature/history.htm>. Accessed 12 March 2005.

National Park Service. *Yosemite National Park: Nature and History*. United States Department of the Interior. Available: <http://www.nps.gov/yose/nature/nature.htm>. Accessed 14 February 2005.

USDA Forest Service, Smokey Bear Fire Prevention Campaign Poster, c.1980.

Walt Disney Studios, *Bambi*, (Burbank, CA; Buena Vista Pictures, 1942)

Walt Disney Studios, *The Jungle Book*, (Burbank, CA: Buena Vista Pictures, 1967)

Williams, Gerald W., Ph.D. *References on the American Indian Use of Fire in Ecosystems*. Washington, D.C.: USDA Forest Service, 18 May 2001. Available: http://www.wildlandfire.com/docs/biblio_indianfire.htm. Accessed 24 February 2005.

Williams, John H. *Yosemite and its High Sierra*. San Francisco: John H. Williams, 1914.