

1-1-2005

The punctuated equilibrium model of policy evolution: An explanation for United States federal fire policy change

Tricia Mynster
University of Nevada, Las Vegas

Follow this and additional works at: <https://digitalscholarship.unlv.edu/rtds>

Repository Citation

Mynster, Tricia, "The punctuated equilibrium model of policy evolution: An explanation for United States federal fire policy change" (2005). *UNLV Retrospective Theses & Dissertations*. 1890.
<http://dx.doi.org/10.25669/v4oi-pcr5>

This Thesis is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Thesis in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Thesis has been accepted for inclusion in UNLV Retrospective Theses & Dissertations by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

THE PUNCTUATED EQUILIBRIUM MODEL OF POLICY EVOLUTION:
AN EXPLANATION FOR US FEDERAL FIRE POLICY CHANGE

By

Tricia Mynster

Bachelor of Science
California State University, Monterey Bay
2001

A thesis submitted in partial fulfillment
of the requirements for the

**Masters of Science Degree in Environmental Policy
Department of Environmental Studies
Greenspun College of Urban Affairs**

**Graduate College
University of Nevada, Las Vegas
December 2005**

UMI Number: 1435621

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI[®]

UMI Microform 1435621

Copyright 2006 by ProQuest Information and Learning Company.

All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346



Thesis Approval

The Graduate College
University of Nevada, Las Vegas

November 17, 2005

The Thesis prepared by

PATRICIA MYNSTER

Entitled


THE PUNCTUATED EQUILIBRIUM MODEL OF POLICY EVOLUTION:

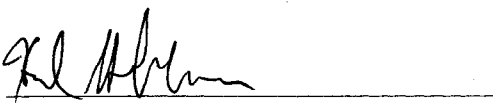
AN EXPLANATION FOR U.S. FEDERAL FIRE POLICY CHANGE

is approved in partial fulfillment of the requirements for the degree of

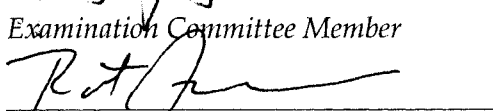
MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE


Examination Committee Chair


Dean of the Graduate College


Examination Committee Member


Examination Committee Member


Graduate College Faculty Representative

ABSTRACT

The Punctuated Equilibrium Model of Policy Evolution: an Explanation for US Federal Fire Policy Change

By

Tricia Mynster

Dr. David Hassenzahl, Examination Committee Chair
Assistant Professor of Environmental Studies
University of Nevada, Las Vegas

The organizational structure of federal land management agencies is designed to function in a static state for long periods of time. Policies in these bureaucracies tend to follow a punctuated equilibrium pattern of evolution. These policies are accompanied by reinforcing institutional arrangements and networks that resist changes. In order for change to occur, a catalyst is needed to cause a drastic change in policy. Following this change, new institutional arrangements will be created to support the new policy. A catalyst is needed at the lower levels of the bureaucracy to follow a policy through to implementation. Using the National Park Service and Yosemite National Park as case studies it is demonstrated that the punctuated equilibrium model is an accurate description of policy evolution.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGMENTS	v
CHAPTER 1 INTRODUCTION	1
Policy Theory.....	2
CHAPTER 2 CASE STUDY METHODOLOGY.....	13
CHAPTER 3 RESULTS OF HISTORICAL RESEARCH.....	17
Federal Fire Policy.....	17
Yosemite Fire Policy	34
CHAPTER 4 DISCUSSION.....	42
Federal Fire Policy	42
Yosemite Fire Policy	46
CHAPTER 5 CONCLUSION	50
BIBLIOGRAPHY.....	53
VITA.....	58

ACKNOWLEDGMENTS

I would like to thank Dr. David Hassenzahl for being a supportive advisor. I would like thank Dr. Hal Rothman for his assisting me in my research and the opportunity to work in the Yosemite National Park archives. I would like to think my other committee members for their comments on the paper. I would also like to thank my friends and family who help me remain optimistic in every adventure I pursue.

CHAPTER 1

INTRODUCTION

The discovery of fire has always been considered a monumental accomplishment of humankind, but fire has always been an integral component of the natural world. When humans discovered fire, what we really discovered was that we could control fire. Fire, a destructive force under its own power, could be captured at the whim of humans. Since that point, humans have put fire to work: cooking, heating, clearing land. We have also been in a battle with any wild fire that has dared to burn without our consent.

The battle between humans and fire has raged on within our federal government as well. When federal land agencies were established at the beginning of the twentieth century, their mission included protecting the land from wild fires. For most of that century, the federal government brought all of their resources to bear against fires burning in national forests and parks. As scientific understanding grew regarding the role fire played in an ecosystem's development, the government reconsidered its relationship with fire.

The official policy for the National Park Service changed in 1968 from suppression of all fires to recognition that fire was an ecological process that needed to be allowed in the parks. It has been almost forty years since that policy change, but there has been a significant delay in the implementation of the policy within the parks

themselves. Why do some parks take up the challenge of the new policy while other parks adhered to the outdated practices of the old policy? How much strength does a federal mandate carry for the management of individual parks? Could the bureaucratic structure of the land management agencies be inhibiting the implementation of the policy?

This paper compares fire policy at the local and national level to assess how policies evolve. Yosemite National Park will serve as a case study site to evaluate whether the punctuated equilibrium model of policy evolution describes policy changes at either or both levels. This thesis is organized as follows. The introduction explains punctuated equilibrium theory of policy evolution and describes the history of fire management policy. Next, the methods section illustrates how historical research will be conducted to track policy changes, and how these observed changes will be evaluated to determine if a punctuated equilibrium pattern is reflected in the history. The results section narrates the policy histories at the federal and park level. Those narrations are interpreted in the discussions chapter to assess the hypothesis that the punctuated equilibrium model explains policy formations at all levels of federal land management. This final chapter will also discuss what catalysts prompt changes at the different levels.

Policy Theory

Political scientists discuss policy in terms of rational choice, power structures, networking groups, and socioeconomic influences.¹ These frameworks aid in studying how ideas are spread or promoted, but these theories are smaller components of the larger

¹ Peter John. "Is there Life After Policy Streams, Advocacy Coalitions, and Punctuations: Using Evolutionary Theory to Explain Policy Change?" *The Policy Studies Journal* 31(2003): 481-96.

context of policy change. Comparing policy change to the theory of evolution that explains change in species over time is a more comprehensive method of analysis.

Evolution is a process whereby the dominant characteristics represented in a gene pool changes. There is a dominant gene and then a mutation occurs. The mutation is selected, replicated through the reproductive process, and expands throughout the gene pool until it becomes the dominant gene. Policies evolve similarly in that there is a dominant policy and then there is a policy change, analogous to a mutation. Policy changes can occur through a recombination of ideas or through a random event that draws attention to another policy alternative.² The new policy is selected, implemented, and becomes the new guiding principle for future courses of action.

An alternative theory of policy evolution would be one of incremental change.³ According to this theory, policies and their consequences are often too complex to be fully understood by decision makers. Because of this complexity, only one aspect of a policy can be examined and changed at a time. Each time a policy gains a spot on an agenda, it receives some measure of reform that adds up to a large change over a long period of time. Changes are made incrementally because they still use and are based on the current policy. Federal fire policy does not reflect this model of policy evolution. In the case of fire management, the change was a drastic reversal of policy. While there were smaller changes in thinking and disagreement about how fires should be managed on federal lands throughout the history of the National Park Service, those changes were not reflected in the policy until they were unified in some form of a catalyst that caused a

² John, 491.

³ Charles Linblum, "The Science of 'Muddling Through.'" *Public Administration Review* 19 (1959):79-88.

punctuation in the policy. Federal fire policy is an example of the punctuated equilibrium model.

It is important to recognize the organizational structure of federal land management agencies to understand how directives are implemented at the park level. Federal agencies are organized as a bureaucracy. Policies in a bureaucracy are dictated down a hierarchical chain of command through fixed procedures to many offices and departments. Within the structure of hierarchically arranged authority, personnel decisions are governed by general rules⁴. All problems requiring a decision are categorized and dealt with based on the rules for that classification. This process precludes the need for issuing specific orders for individual cases. It also limits the decision process so that it is based on past decisions that established precedents for that category. In this manner, policies remain static.

The hierarchical structure of these bureaucracies assumes that lower level offices will follow rules mandated to them from offices higher in the organization. However, the diversity of lands, and the expertise and discretion possessed by lower level bureaucrats in the National Park Service, gives each field office a measure of autonomy. Policies do not flow through bureaucracies from policy to practice the minute a new policy is released. A separate impetus is needed to force the implementation of a policy change. The policy change in the higher offices simply authorizes lower offices to change their current practices, but it does not necessarily give them motivation to do so.

The punctuated equilibrium theory elaborates on policy evolution by explaining that policies will continue along an initial pattern, resistant to change, and attracting little

⁴ Robert K. Merton. "Bureaucratic Structure and Personality" in *Classics of Public Administration*. Eds. Jay M. Shafritz and Albert C. Hyde (Orlando: Harcourt Brace and Company) 100

attention while public focus changes to newly emerging political issues. Eventually a mutation or focusing event serves as a catalyst to draw attention to a new policy alternative⁵. In the punctuated equilibrium model policies are reinforced with policy networks and monopolies that control resources for specific policies. A policy network is a coalition of agencies and individuals that influence decisions in a given policy arena.⁶ Alternative policies may not have access to the resources controlled by these institutions, and in this manner are excluded before they can become new policies.

A punctuation in policy evolution can be graphed as an S-curve. A line that does not change with time would represent the established policy with its supporting institutional arrangements. A catalytic event would cause the jump, or punctuation, to a new equilibrium where a new policy monopoly would form to support the new point of stasis (see Figure 1).

Often, problems that are addressed in the form of public policy are too large for the policy maker to completely comprehend. Fixed on one facet of a problem, policymakers fail to see the systemic reaction to a policy. Advances in science and technology may proceed faster than the government process of policy review and reform. Policies tend to fixate on one aspect of a multi-faceted problem, which may lead to aggravating the problem the policy was originally intended to fix⁷. However, the existing institutions supporting the flawed policy make it difficult to correct.

⁵ James L. True, Bryan D. Jones, and Frank R. Baumgartner, "Punctuated-Equilibrium Theory: Explaining Stability and Change in American Policymaking," in Theories of the Policy Process, ed. Paul A Sabatier (Boulder: Westview Press, 1999), 91-113.

⁶ George Busenberg, "Innovation, Learning, and Policy Evolution in Hazardous Systems", American Behavioral Scientist, 44 no. 4 (2000): 679-691.

⁷ True, Jones, and Baumgartner, 103.

Punctuated Equilibrium Model

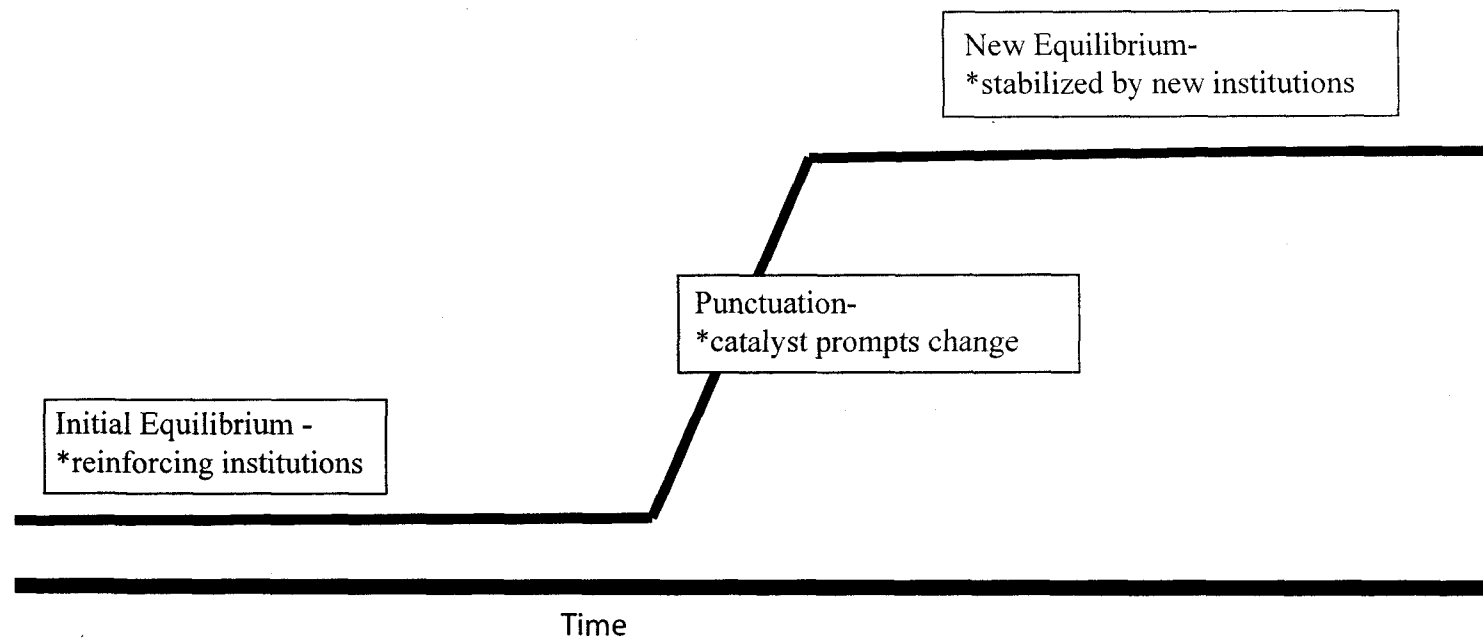


Figure 1. Pattern of Punctuated Equilibrium Model

The federal agencies that manage public lands are bureaucratic. They are designed to govern a large agenda by limiting the role of each member of the organization to a particular function. Most bureaucratic offices involve the expectation of long-life tenure, in the absence of disturbing factors. Vocational security provided to employees ensures devotion to the organization despite external pressures⁸.

Federal agencies align their employees in a manner so that personal preferences of employees match the agency's objectives. Uniforms, similar educational backgrounds and training, and high transfer rates are designed so that employees identify themselves with the federal agency, not the local community.⁹ These techniques are meant to foster unity across the agency despite distance between locations and influences of local population. These socialization methods exist in bureaucracies to dissuade any differing personal preferences a person might have when entering the organization. In this manner, bureaucracies reinforce existing policies.

Federal jobs are highly sought after because job security is guaranteed, but without rapid advancement. Once a job is secured, an employee could perform the same function everyday without any change in pay or benefits. This structure is meant to ensure consistent performance from the employees, but it also limits any initiative the employee may have. Even if a member of the bureaucracy displays innovation in their work, there is no reward. The rational choice model of how individuals behave in an organization shows that without reward, employees do not exert the extra effort to follow

⁸ Merton, 100.

⁹ Herbert Kaufman. *The Forest Ranger*. John Hopkins Press. 1960: 161-200. This whole chapters describes the methods by which the Forest Service recruits and trains men so that they willfully follow orders and have the expertise to do so. The preceding chapter discusses the feedback loops in place in the organization's structure to detect and discourage deviation within the agency.

up on new ideas¹⁰. A lack of incentives serves the greater bureaucracy by ensuring stability and consistency towards the established policy outcome.

While bureaucratic structures function in a top-down allocation of power, the reality of large organizations do allow for a significant amount of discretion in the lower levels of the agencies. The power of this discretion provides an avenue where catalytic changes can occur. A manager at the field office level has a certain amount of autonomy to implement plans and policies as he sees fit. When taken together, the individual decisions of these workers become, or add up to, agency policy.¹¹ Field level managers are still subject to directives from above, but the amount of their discretion gives them power of local policy. They are relatively free from supervision or scrutiny from supervisors or constituents.¹²

The number of responsibilities assigned to the field level manager outweighs the resources he or she is given to do them. As a result, a field manager must prioritize policies based on the preferences he or she brings to the office. Some policies will have favor with the manager while others that the manager personally disagrees with will be neglected. The local expertise that is crucial to successfully implementing policies also protects a ranger's authority from higher-level figures in the organization since they do not possess working knowledge of the land to operate the office without the ranger.

An example of the power of the site superintendent is seen in Colonel John White, superintendent of Sequoia National Park during the 1920's. Despite the policy that fire

¹⁰ Charles Barnard, "The Economy of Incentives", in Classics of Organization Theory, eds. Jay M. Shafritz and J. Steven Ott (Belmont: Wadsworth, 2001) 93-102.

¹¹ Michael Lipsky, "Street-Level Bureaucracy: The Critical Role of the Street-Level Bureaucrats" in Classics of Public Administration, eds. Jay M. Shafritz and Albert C. Hyde (San Diego: Harcourt Brace, 1997) 401-408.

¹² Michael Lipsky, "Street Level Bureaucrats as Policy Makers", The Political Environment of Public Management, (San Francisco: Addison-Wesley) 89-100.

was to be suppressed, he publicly supported prescribed burning, which at the time was called light burning.¹³ Because of the respect he had earned during his long tenure with the park he was not punished even though he directly defied the dominant philosophy governing the agency regarding fire at the time. He was simply denounced as a dissenting voice in the face of the federal policy of suppression.¹⁴

Field managers need discretion to allocate resources based on the needs of different lands. Agency-wide policies will have different applications to different field offices. For instance, all national parks must have a fire plan, but while some plans include such specialized practices as prescribed burns, fuel treatments, etc., others simply state that the local municipal fire station is responsible for responding to any fires onsite. National agencies recognize the power of the field office manager and admit to a decentralized administration, but agency wide mandates and hierarchical structures still make it a bureaucracy. Despite the methods of integrating the diverse rangers into the agency in a manner to preserve its integrity as a nationwide organization, the power of the field office cannot be overlooked as a significant aspect of policy change and implementation.

Policies are only effective if they come with the resources to implement, maintain, and enforce them. Symbolic policies are made that show a support for an idea, but do not follow through with budget appropriations. National Parks get fire management funding through FIREPRO, a program that forecasts in which parks fire resources will be needed

¹³ Stephen J Pyne, Fire in America: A Cultural History of Wildland and Rural Fire, (Princeton: Princeton University Press, 1982) 297.

¹⁴ Hal Rothman, manuscript for A Test of Adversity and Strength: Wildland Fire in the National Park System, (forthcoming administrative history, NPS) 91.

from year to year based on past fire histories, weather trends, and fire plans.¹⁵ While funds are available for prescribed burns through FIREPRO, it rests upon the park superintendent and fire management teams to request the funds for that year. Funds are not automatically allocated for burn plans to each park. In this manner, the budget needed to implement burn plans depends on the enthusiasm of the park personnel to go out and secure the funds or supplement them with general park funds.

In addition to the constraints a bureaucratic organization imposes on policy changes, federal land agencies must obey the National Environmental Protection Act. The NEPA Act of 1970 requires that federal agencies evaluate and disclose the environmental impacts of their proposed actions. As part of this process, comments are requested from the public. At the end of that comment period, the agency evaluates the comments and revises the EIS in response to issues raised by these comments. The agency then issues a final EIS (FEIS), followed by a "record of decision" (ROD) in which the agency notifies the public of its decision. But the federal courts have ruled that NEPA is a purely procedural statute. Even after preparation of a full EIS, NEPA does not require any particular decision. It just requires that the agency do the analysis and reporting required by law.¹⁶ The lengthy studies involved in preparing an EIS can cause policy gridlock. Additionally, if a citizen group feels that an EIS was prepared unsatisfactorily or the NEPA process was sidestepped illegally, they can bring a suit against the agency. In this way, fire plans can be held up in court for years going back and forth between agencies and citizen groups.

¹⁵ Reference Manual 18: Wildland and Prescribed Fire Management Policy, Chapter 17: FIREPRO Analysis, available online at http://www.nps.gov/fire/download/fir_wil_rm18_ch17.pdf accessed 8/16/05. Debra Schweizer, email to author, 13 July 2005.

¹⁶ The NEPA Act of 1969. Public Law 91-190 (42 U.S. C. 4321-4347) January 1, 1970.

Involved citizens of the local communities are significant in deciding how local politics play out. When the public shows fear of fire, they can tie up burn plans in court and prolong the hazardous fuel problem, which is what happened in Arizona in 2002. Government forest rangers had been fighting local public and environmental groups for years to thin a forest through commercial logging to reduce the hazardous fuel load. Three years of appeals and rebuttals suspended the plan, increasing the hazard of a catastrophic fire to the very forest the environmental groups were trying to protect. In June of 2002, 460,000 acres burned, including some of those that would have been treated to be more fire resistant, making the court cases moot.¹⁷ The key factor in this example was how fire was perceived by the park's constituents. The first experimental fire program in the National Park Service occurred in the Everglades where locals supported fire as part of the natural setting.¹⁸ Fire management plans now include a portion for educating the public on the benefits of fire to the forest.

In addition to local community action, local events, such as catastrophic fires, can change field office priorities. Just as the Big Blowup in 1910 changed national fire policy, local fires, like the Lost Cabin Fire outside of Las Vegas in 2002, can draw attention to a neglected policy. It was not until after the Lost Cabin fire that the Las Vegas field office foresters submitted a proposal for new fire management operations in the Toyabe-Humboldt National Forest¹⁹.

The mission and objectives behind the reasoning that resulted in setting aside each plot of public land – whether it was for the extractions of raw materials, recreation, or the

¹⁷ Paul Trachtman, "Fire Fight", *Smithsonian*, 34 (5):42-51.

¹⁸ Hal Rothman, manuscript for *A Test of Adversity and Strength: Wildland Fire in the National Park System* (forthcoming administrative history, NPS) 167.

¹⁹ Dewey Warner, interview with author, 6 February 2004.

preservation of natural processes - will affect which policies get a high priority. Since timber operations mechanically thin forests through the harvesting process, reintroducing fire to those regions may not be as risky as it would be in a park where fuel loads have been accumulating without disturbance for 60 years. If conservation of ecological processes is the mission of the area, reintroduction of fire becomes a priority since it is a natural occurrence that shapes ecosystems. Studies have found that visitation from hikers and mountain bikers changes as areas recover from fire, but how that visitation changes varies from one region to the next²⁰. In this respect, managers may have to decide between maintaining ecological processes and visitor recreation.

This paper will show that the bureaucratic structure of federal land management agencies, with the supporting networks and monopolies they create, require a catalytic event for policy change at the federal level. Any change in policy at that level will need to be followed through with another catalyst for change at the park level where managers often choose which agency objectives get priority. Historical research will show change in policy trends and identify which action led to those changes.

²⁰ Hayley Hesseln, John B Loomis, Armando Gonzalez-Caban, and Susan Alexander, "Wildfire effects on hiking and biking demand in New Mexico: a travel cost study." Journal of Environmental Management, 69 (2003) 359-368; John B. Loomis, J Englin, and Armando Gonzalez-Caban, "Effects of fire on the economic value of forest recreation in the intermountain west: preliminary results," (USDA Forest Service Gen-Tech-Rep. PSW-GTR-173, 1999) 199-208.

CHAPTER 2

CASE STUDY METHODS

Policy dynamics are integrated with value-based decisions. Because of the subjective nature of how and why policies are created, a case study analysis was used for this study. Case studies allow research to include the context of the variables being examined while following specified procedures that allow a question to be empirically investigated within its real life environment. This method is in contrast to a laboratory method that isolates variables in controlled environments or a statistical analysis that relies on frequencies.²¹

The case study approach that will be used for this analysis is that of pattern matching where an empirical pattern is compared with a predicted pattern. Based on the information collected, graphical patterns will be established for both federal and local fire policy histories. The graph will have an x-axis representing time, and a y axis that will represent policy objectives. Those graphical patterns will then be compared to the pattern established for a policy history that follows the punctuated equilibrium model.

The graphical representation will depend on identifying which factors caused or inhibit policy changes. The information for the national fire history can be found in secondary literature, agency management documents available on the Internet, and

²¹ Case study methodology was adapted from Robert K. Yin, Applications of Case Study Research (Thousand Oaks: Sage Publications, 2003) 3-27.

interviews. Secondary literature included works by Stephen Pyne, one of the principal authorities on fire history. Most of the literature regarding national fire policy included a section on Yosemite National Park, highlighting the park's significance. Many of the management documents and the director's orders that dictate Park Service policy are available on the Internet. The National Interagency Fire Center in Boise, Idaho maintains a website with links to the national fire plan and the various organizations that administer the joint task of managing fire in the United States today.

The history of fire in Yosemite National Park will be collated from primary sources from the park's archive, in addition to secondary sources, and interviews. The park's archive is located in El Portal with the park administration offices. There is a park archivist available to help with access to the archive and locating relevant files. There is also a finding guide for the Yosemite archives that is a good starting point for locating critical files. The files are organized by topic and year. Forest fire management files are in files starting with the file code Y14. There will be a file for each year. Documents are available to be viewed on site, but only scans or copies can be taken out of the archive.

A variety of documents can be found in the archive files. Among them were early superintendent reports, which were narrative accounts of park events with policy recommendations. They helped to establish not only Yosemite events and considerations, but also what the federal view on these problems was. They also help to establish the changing view of fire and whether the opinion was prevalent at the different levels of the bureaucracy's organization. All superintendent reports throughout the park's history are now available on CD-ROM, and information concerning all aspects of the park's operation can be found in them.

As the bureaucratic organization of the Service evolved, it was restructured, as was the method of annual reporting. Annual fire reports can be found from the 1940's to the present, which include statistics on number of fires, causes, new equipment used, and requests for equipment, training, personnel, etc. There were also comparisons between fire events of previous years.

Federal staff writes technical reports on a number of topics for broad circulation. Some reports are from the Forest Service; however, Yosemite research scientist, Jan van Wagtendonk, wrote many of the helpful documents himself. Topics included brief histories of fire policy at Yosemite, case studies of prescribed burns, and discussion of significant personnel who contributed to the development of the fire program.

Many of the primary source documents were letters of memorandum between park employees. The memos were directives from higher offices in the agency, requests for equipment or training programs, and reports on specific fires in the park. Several letters included requests for help developing fire programs at other sites, establishing that Yosemite's program was used as a model for other locations.

Several past park employees were interviewed to help complete the history of Yosemite's fire program. I interview Jan van Wagtendonk over the telephone. While he is no longer an employee for the National Park Service, he does have an office with the United States Geological Survey at the El Portal administration offices. Hal Rothman interview Jim Agee and Bob Barbee over the phone while researching his book on the history of fire policy for the National Park Service. I was able to get the transcribed interviews from him.

The hypothesis is that the documents will be able to identify catalysts that created a change in policy at the federal level and a separate set of factors that allowed that policy to be implemented at the park level. Therefore the predicted pattern is that both policy evolutions would follow the punctuated equilibrium model as seen in Figure 1.

CHAPTER 3

RESULTS OF HISTORICAL RESEARCH

Federal policy

Establishing Problem Definition

The United States Forest Service was created in 1905 during Theodore Roosevelt's administration. Originally the Forest Service was charged with protecting its reserves from senseless logging and to ensure watershed integrity²². Fire was a secondary concern. Natural wildland fires were a hazard that had to be endured like harsh winters and epidemics.²³ The Forest Service's 1905 Use Book regulations do not define a clear fire policy, rather it has guidelines for how fires are to be set, attended, and extinguished. Fires caused by lightning are referenced only in a short paragraph within the patrol section on page 68 of the manual declaring "fires caused by lightning are not rare, especially in dry mountain regions. After every electric storm a special effort is needed to locate and extinguish any such fires before they are well under way²⁴."

²² David Clary, Timber and the Forest Service (Lawrence: University Press of Kansas, 1986).; Harold K. Steen, "The Origins and Purposes of the National Forests" in Public Lands, Public Heritage: The National Forest Idea by Alfred Runte (Niwot, CO: Roberts Rinehart Publishers, 1991) 69-77.

²³ Stephen Arno and Steven Allison-Bunnell, Flames in Our Forest: Disaster or Renewal? (Washington, D.C.: Island Press, 2002) 15-16.

²⁴ Gifford Pinchot, The Use of the National Forest Reserves: Regulations and Instructions (Washington, D.C.: Government Printing Office, 1905) 68.

The fledgling agency quickly changed its policies to reflect a clear priority against any fire. In 1908, Congress passed an appropriations bill²⁵ that allowed the Forest Service to receive advanced funds for firefighting emergencies. Through suppression efforts, the Forest Service was enabled to spend money well beyond its annual appropriations. Congress gave the Forest Service the budgetary flexibility that was needed to make suppression work. This type of institutional arrangement reinforced the Forest Service's policy.

The Big Blowup of 1910, a two-day wildfire that killed 85 people and burned three million acres across Idaho and Montana, acted as a focusing event for fire protection. The fact that the fire had been a result of traditional light burning practices, purposefully set fires meant to clear land or propagate certain vegetation types, further illustrated the hazards of any fire on the land²⁶. Suppression could be the only policy. Foresters would remember those fires as a soldier remembers the battles he fought in. The 1910 fires became the symbol for the Forest Service's war on fire that held strong as a national policy for the next 60 years.

Fire protection was defined as an issue of suppression. The focus of policy was on how to effectively eradicate fire from the forests as opposed how to manage or mitigate fire effects. Support was gathered for wildland firefighting without consideration to wildland fuel accumulation or how that would affect forest ecology. The absence of fires in wild lands caused for an increase in brush and small trees. This type of vegetation acts as kindling that will increase the intensity of a fire as it burns through the forest creating catastrophic fires rather than low intensity burns that occur

²⁵Stephen J. Pyne, Fire in America: A cultural History of Wildland and Rural Fire (Princeton: Princeton University Press, 1982) 236; 16 U.S.C. 500, 553, 556d Public Law 60-136, May 23, 1908.

²⁶ Pyne 1982, 243.

naturally at regular intervals. Fire offers a regular disturbance to the forest ecosystem. Ecosystems recover from disturbances through the process of succession, increasing biodiversity. The type of vegetation that occurs without disturbances decreases biodiversity affecting wildlife, insect infestation, and disease. In this manner, suppression policies will eventually cause more harm to the forests than the fires they are excluding.

While a national policy of suppression did dominate forest management, many foresters understood that fire was a tool that could be used to help prevent such catastrophes. In 1919, “A Policy of Forestry for the Nation” was presented before forestry conferences that stated that fire protection required “an effective service for preventing forest fires and detecting and suppressing those which may be started²⁷.” However, the same report went on to state that service should take “measures to reduce inflammability of the forests.” Among the treatments listed to do this was the use of fire to clear brush piles, burn overs in areas protected by fire lines, and controlled burnings at times when the climate and fuel loads were safe. This document demonstrates that while suppression was a technique that was encouraged, fire could also be used rather than battled to prevent loss of lives and resources.

In spite of this knowledge, the Forest Service shared the public’s fear of forest fires. These fears propagated a regrettable policy decision by keeping the focus on suppression. Wildland fires were no strangers to early Americans. Historical fires of note include: a Michigan fire in 1881 that burned one million acres and killed over 150 people and a Minnesota fire in 1894 that killed over 400 people²⁸. People were often

²⁷ Henry S. Graves, “A Policy of Forestry for the Nation.” U.S. Dept. of Agriculture Circular 148 (Washington, D.C.: Government Printing Office, 1919) p. 6.

²⁸ “Historical Wildland Fire Statistics” National Interagency Fire Center website at <http://www.nifc.gov/stats/historicalstats.html> accessed on 12 April 2004.

overwhelmed at the sheer power and destructive force these fires wielded. As more people moved into frontier forests, more fell victim to these holocausts, leading to a sympathetic constituency when suppression policies were proposed. The fires of 1910 fortified the Forest Services position of total fire suppression.

The Weeks Act of 1911²⁹ provided funds for the USFS to acquire more forested watersheds to protect navigable waters; however, it also allocated some funds that were to be used for protection of those forests. Protection of the forests included protection from fire. The funds were used to help cooperation between other federal agencies, state organizations, and local citizens when protection was needed. Through the control of funding, the USFS controlled national fire policy on lands beyond the federally owned forests. The Weeks Act provided another institutional support for suppression by providing resources for firefighting. Firefighting would continue to be a justification for the expansion of the Forest Service's influence.

The National Park Service was created through the Organic Act of 1916. The new land management agency adopted forest protection personnel and policy from the already established Forest Service. The USFS has the expertise, the respect of the public and politicians, and the funding. The policy of suppression in national parks was accepted without question.

Prior to the Park Service administration, National Parks were occupied by military troops who acted as firefighters along with local landowners. Suppression resources were spread thin across large expanses of land. The people inhabiting the lands did what they could, but suppressing all fires was an impossible task. The creation of an agency to manage these lands did little to change these circumstances.

²⁹ The Weeks Law, 16 U.S.C. 563 Public Law 108-198, March 1, 1911

The NPS was created to bring people to the parks. More people meant more opportunities for fires to start (trains, smoking, camp fires) as well as a higher hazard of what that fire could do to people and structures. However, at the time, Congress dedicated funds to war efforts and little to the fledgling Park Service. In 1918 no monies were allotted for fire fighting.³⁰ The NPS did not have the expertise in fire suppression, so managers cultivated relations with foresters, increasing the influence the USFS had on NPS fire policy.

Fire was addressed as an unexpected emergency rather than an endemic condition or natural process. As such, emergency funds were used to fight fires as they occurred rather than used to provide an annual steady budget for any preventative means. The 1924 Clarke-McNary Act,³¹ which gave federal assistance and grants of aid for fighting forest fire, allowed cooperation between federal agencies and locals. The Act increased the resources available to fight fire, but was administered through the USFS. The influence of the USFS was further expanded through the Forest Protection Board, one of the earlier interagency cooperation organizations that existed to coordinate activities among federal land agencies. With William Greeley, Chief Forester of the USFS, as the director, USFS policies and procedures were spread to other federal agencies through the board. The Forest Protection Board existed from 1927 through 1933 when it was superceded by efforts conducted through the New Deal. Decades later, the efforts of the Forest Protection Board would be reinvented through the National Wildfire Coordinating Group.

³⁰ Rothman, 66.

³¹ The Clarke-McNary Act. 16 U.S.C. 568 Public Law 68-270. June 7, 1924

The Forest Service created a policy monopoly by establishing control over the funds and organization that oversaw fire management and protection plans. As long as it was committed to suppression as the dominant policy, all public lands would be managed according to that policy. Even research was controlled by the Forest Service through the McSweeney-McNary Act of 1928³², which gave the Forest Service responsibility over all federal forest research, including fire research. For most of the twentieth century the Forest Service would deny funds for parks or programs that used fire rather than suppressed it.

New Deal

President Franklin Roosevelt introduced the New Deal during a time when the dominant philosophy was that humankind could conquer nature through science and technology, including control of fire. Conservation created a large demand for work. It was highlighted in the media and gained public momentum. With the support of the nation, the policies of suppression were reinforced.

One of the New Deal programs applied to public lands was the Civilian Conservation Corps. A large portion of these resources were allocated through the FS. The men in the CCC built fire towers, truck roads that allowed easier access to forest fire control, and fire breaks. These efforts extended the reach of fire suppression into wildlands and back country. The country's young men were the first line of defense as they fought fires. In many states, fire suppression fell solely on the shoulders of the CCC as directed by the regional forester.³³

³²McSweeney-McNary Act of 1928. 16 U.S.C. 581

³³ Perry H. Merrill, Roosevelt's Forest Army: A History of the Civilian Conservation Corps (Barre: Northlight Studio Press, Inc., 1981) 42-53.

CCC efforts were also directed toward visitor enhancements such as new trails and structures. The infrastructure created during the New Deal allowed for increased visitation throughout the following decades. The paradox of public lands is to encourage visitation while protecting the parks from the impact of those visitors. As more guests explored parks and forests, fire hazards also increased.

Original park and fire plans called for early recognition and suppression before fires got big, but these plans were not feasible without adequate funding. With the New Deal, funding and labor was available for more lookouts for quick detection. The “10 AM Policy” was enacted in 1935 and held through the 1960’s³⁴. This policy declared that all fires were to be extinguished by 10 AM the morning after they were detected. The suppression policy worked; the number of catastrophic fires declined. Technology and free flowing resources made suppression an efficient battle.

Besides the political view that kept this policy intact and enforced, the public supported the ideals of suppression. Public campaigns in the 30’s, 40’s and 50’s, including the famous Smokey Bear ads, proved to be highly effective. Youth organizations were coordinated to spot and help suppress fires in rural districts. These organizations included the Boy Scouts, 4-H, and Green Guards³⁵. In addition to the obvious help of keeping fires out of the forest, these organizations propagated the idea that fire was the enemy. This message was instilled in the public to the extent that the public accused federal agencies of burning national treasures, and scorching the land and

³⁴ Stephen J. Pyne, Patricia L. Andrews and Richard D. Laven, Introduction to Wildland Fire (New York: John Wiley & Sons, Inc., 1996) 256; Ross W. Gorte, National Forests: Current Issues and Perspectives (Hauppauge: Nova Science Publishers, Inc., 2003) 136.

³⁵ Pyne 1982, 175.

sky when policies started to shift toward the inclusion of fire in the forests in the latter part of the twentieth century.³⁶

War and Post War Influences

Our national hatred for fire deepened throughout the 40's as it was compared to wartime enemies³⁷ Fear that enemy bombs would burn our timber made any fire on public lands a waste of valuable resources that would only benefit our enemies. At the same time, the funds and labor needed to make suppression work were redirected toward the war effort leaving our forests vulnerable.

As the war subsided, military technology and operations were used to combat infernos and smoke jumpers replaced soldiers as national heroes as World War II came to an end. While the aerial technology allowed suppression efforts to be more efficient in back country areas not often visited by people, the amount of suppression resources did not reach pre-war levels.

Post war affluence allowed more people the opportunity to explore their public lands. However, without an increase in funds towards national parks, these areas were stretched thin accommodating for the increased number of visitors while trying to mitigate their impacts. More people in the parks meant more fire hazards. A reactive policy to suppression when fires were spotted was the only way the agencies knew to respond, but they didn't have the army of CCC laborers anymore with which to battle blazes.

Educating the public became the top policy for fire prevention. There was no budget for any other form of preventative measures that would allow for the treatment of

³⁶ Arno and Allison-Bunnell, 22-25.

³⁷ Pyne, 1982. 176; see also David Carle, *Burning Questions: America's Fight With Nature's Fire*, (Westport: Praeger Publishers, 2002) 81-87; Steen, 72-73.

lands with abnormally high fuel loads. As education reigned in human induced fires, lightning strikes took a bigger toll. Suppression efforts were shifted deeper into wild lands with the use of aerial technology. Extinguishing lightning ignitions in areas that were previously inaccessible meant increasing hazardous fuel loads there.

In 1956 the NPS conceived of the Mission 66 plan; a plan to update and improve the parks in honor of the Service's fiftieth anniversary. Mission 66 temporarily breathed life back into suppression with the large number of resources needed to make suppression work. Increased roads and trails was one manifestation of this plan, but increased access for suppression was also access for visitors who brought fire with them. As visitors and technology increased, so too did suppression costs.

Another outcome of the Mission 66 plan was more research in the parks led by the scientists hired with the new funding the plan provided.³⁸ Although federal agencies were not ready to change their position on fire policy away from suppression as yet, the increased amount of collaborative research in the parks was the first step toward a punctuated change in policy.

Changing Policy

Between the years of 1951 and 1952, Everglades National Park hired William Robertson to do fire research at the park. By 1953, the park was conducting controlled burning experiments. The local public accepted fire as one of the natural components that made up the ecosystem. Due to the large amount of precipitation Florida receives, fire was seen through a different lens of cultural symbolism. It was not the destructive force that it appeared to be in the West. Burning continued, with public support, and in 1962 the Tall Timbers Research Station started conducting an annual series of fire

³⁸ Rothman, 188.

ecology conferences that proved to be influential. The Everglades burns were the first time the Park Service took the initiative to explore including fire as part of natural resource management.³⁹ It did not change federal policy, but it did open the door to the possibility that suppression not be the dominant protocol.

Although burning in the Everglades did not face public outrage, conditions in the West were different. The public wanted to protect the brush that posed the threat of a catastrophic fire. Experimental burns were being conducted, but not on park property. Harold Biswell was working with ranchers in California - burning grazing lands to increase feed.⁴⁰ His work would extend to the conifer forests of the parks in California.

The Park Service was placing an increasing importance on scientific training of its personnel. Historically, the NPS had hired forest personnel or rangers who had come out of schools of forestry that placed priorities on protecting timber and wildlife without looking at the ecological whole of how things interact. A program was created that sent rangers back to school for scientific training.⁴¹ Additionally, the returning veterans had access to specialized training through the GI Bill creating a larger pool of employees with diverse training in a variety of scientific fields beyond traditional forestry methods. Older bureaucrats, who were strong believers in suppression, retired and were replaced by younger graduates with more knowledge of ecology.

Science was the catalyst for these policy shifts in the 1960's. Studies from federal foresters, private foresters, and scientists accumulated throughout the twentieth century. The emerging field of ecology in the 1950's and 1960's confirmed what many had been

³⁹ Pyne, 158-159.

⁴⁰ Jan van Wagendonk, "Dr. Biswell's Influence on the Development of Prescribed Burning in California," (USDA Forest Service, Gen. Tech. Rep. PSW-GTR-158, 1995) 12.

⁴¹ Jim Agee interview with Hal Rothman, 10 June 2004.

saying from the beginning: keeping fire out of the forests was a grave mistake. Research from outside of the park system led to the 1963 Leopold Report,⁴² a wildlife management review of the parks that advised park management to manage wildlife habitat rather than the management of a few species, separate from their environment. The report described fire as a natural ecological process that should be included in park management for healthy ecosystems. Prescribed fires could be a cheap and effective way to substitute for the fires that had been suppressed in the past. The Wilderness Act of 1964⁴³ followed the Leopold Report mandating agencies to retain a land's primeval character as shaped by the forces of nature, which would include fire. This law reflected a cultural change in a more environmentally aware public who valued wild landscapes.

Following the trend of establishing wilderness areas where the forces of nature were guaranteed to continue and the emphasis placed on ecosystem management rather than species management, the NPS released in 1968 their administrative policies in three separate volumes: one for natural areas; a second for recreational areas; and a third for historical areas. The policy intended for the management of natural areas, known as the Green Book, reiterated the Leopold Report. The Green Book gave parks the authority to substitute fire suppression with fire inclusion. Prescribed burns were meant to restore forests to the ecological state that would have been present if suppression had not been forced onto the land. Policy literature saw a change in vocabulary; a shift from fire control to fire management. Hazardous fuel reduction would be a result of restoration, but

⁴² A. Starker Leopold et al., "Wildlife Management in the National Parks," in Transactions of the Twenty-Eighth North American Wildlife and Natural Resources Conference, ed. James B. Trerethen (Washington, D.C.: Wildlife Management Institute, 1963) 29-45.

⁴³ The Wilderness Act. Public Law 88-577 (16 U.S. C. 1131-1136) September 3, 1964.

not necessarily the main objective.⁴⁴ Consequently, the 1968 lightning fires at high elevations in Sequoia and Kings Canyon National Parks were allowed to burn to the extent that they did not harm any human life or structure. These “let burn” fires were to become known as “prescribe natural fires”. More National Parks followed suit throughout the next decade. The Green Book marked the beginning of a change in federal fire policy with the NPS pioneering the way.

The new fire policy had merit beyond its ecological applications. Despite the increased technology, costs of fighting fires were going up. The federal Office of Management and Budget called for alternative fire mitigation methods.⁴⁵ Although fire inclusion was hailed as a natural part of a forest’s dynamics, it also helped by reducing fuel loads in forests. With a decrease in kindling, fires could be controlled and defended against with less cost and damage.

Implementing New Policy

During the 1970’s, this new policy of embracing fire was tested and refined. Reintroducing fire to the forest is not an easy procedure. Forests need to be treated before fire can be applied. With the build up of underbrush and leaf litter, forests have become tinderboxes where any fire, whether set by lightning or trained firefighters, can easily get out of control. Some parks were still nervously avoided letting fire loose in the park while others experimented with burn plans and conditions in order to implement the new policy without sacrificing the lands they were charged with protecting. Yosemite, Sequoia and Kings Canyon National Parks pioneered fire policy in the West while Everglades National Parks continued fire ecology research in the East.

⁴⁴ Cordon Cooper Olson, “A History of Natural Resource Management within the National Park Service,” (thesis, Slippery Rock University, 1986).

⁴⁵ Arno and Allison-Bunnell, 23.

In addition to the concerns associated with re-establishing fire in the forests, new laws were in place that put further restraints on what burn plans were possible. The National Environmental Policy Act (NEPA) of 1969 stated that certain procedures were required, including public input, for plans that were to have a significant impact on federal lands.⁴⁶ Fire programs would be subject to NEPA protocols. The NPS had to find a way to communicate to the public that fire was a benefit to natural areas to avoid conflicts that could be brought up in the NEPA process. This task proved to be difficult because public opinion was strongly influenced by the anti-fire campaigns from the early part of the century. The difficulty was in convincing the public that fire was a benign presence. Even traditional supporters of the park service were upset by the visual of burnt trees, though they understood the logic behind the fires.⁴⁷ The public was also concerned with smoke and the potential problems with air quality as a result of these burns. The 1979 Ouzel fire in Colorado brought suits from the citizens of Boulder with regard to air quality concerns.⁴⁸

Originally, the term for prescribed natural fires was "let burn," but the public felt that it seemed like too casual a stance for the NPS to take on something as dangerous as fire. Prescribed Natural Fire set more of a tone that the park officials were attentively managing the fire. There was also an educational component needed to reassure the public regarding the difference between Prescribed Natural Fires, which are ignited by lightning, and prescribed burns, which are lit by management. There was uneasiness about allowing something nature started and purposefully burning forests. Prescribed burns were sold as replacing a natural process.

⁴⁶ The NEPA Act of 1969. Public Law 91-190 (42 U.S. C. 4321-4347) January 1, 1970.

⁴⁷ Rothman, 256.

⁴⁸ Rothman, 312

The experimental period allowed parks to pursue more structure and consistency among park fire plans. The 1977 Fire Management Policy, referred to as NPS 18, gave some parameters to guide parks with their individual plans, but it was still a loose philosophy rather than a detailed plan. The revisions to the fire management policy throughout the 70's were attempts to centralize the policy and minimize park liability, however the variability between park lands required variations in plans.

The parks stayed dedicated to the new model of fire management. Interagency cooperation increased and, the prescribed burn plans were adopted by other agencies. The Forest Service made an official change in policy in 1978.

There was a trend to consolidate and centralize suppression efforts for wildfires on or near federal lands. The NPS joined the Boise Fire Interagency center (which changes its name to National Interagency Fire Center in 1993 to better reflect its mission) during this time period, establishing a more consistent response to wildfire suppression across all federal land agencies.⁴⁹ Because suppression efforts required large mobilization efforts and large costs, the NPS implemented FIREPRO in 1982.⁵⁰ This program mode forecasted where fire suppression resources will be needed from year to year based on past fire histories and weather trends.⁵¹

The interagency suppression efforts would be tested in 1988 with fires in Yellowstone. The fires in Yellowstone started as prescribed natural fires, but unusually bad conditions spread the fire farther and faster than anticipated. The dry, windy

⁴⁹ NIFC website, "Mission and History of the National Interagency Fire Center," <http://www.nifc.gov/nifcmis.html>, accessed on 16 March 2005.

⁵⁰ Rothman, 299.

⁵¹ National Park Service Reference Manual 18: Wildland Fire Management, Chapter 17: FIREPRO Analysis, available online at http://www.nps.gov/fire/download/fir_wil_rm18_ch17.pdf, accessed 20 April 2005.

conditions led to many fires within the park and in adjacent lands. The blazes were declared wildfires and every effort was made to suppress them, but conditions were perfect for quick combustion and suppression efforts were ineffective. In all, 1.4 million acres, more than 50% of the park, burned over four months time.⁵² Gateway communities were threatened by the conflagrations, which resulted in a loss of their support for PNF programs. Bambi was also re-released in theaters in 1988, sparking sympathy for scorched woodland creatures from a whole new generation of Americans. The loss of the public's support pushed fire from a matter of science to that of politics. Fear of another holocaust resulted in an increase in suppression as the "better safe than sorry" policy. All prescribed natural fires and many prescribed burns were called off until the Yellowstone fire review was released and parks brought their own plans into compliance with the review. The NPS was under scrutiny and political attack. The 1989 Final Report on Fire Management Policy⁵³ was the result of the NPS investigation of those fires.

The Yellowstone fires were followed by a combustible decade with the loss of many acres and firefighters. While the fires of the 1990's were destructive and tragic, the NPS stood by its science-based policy allowing fire on the land, trusting that the public would fall in line if they understood the dynamics of fire ecology. 1994 brought 34 deaths in the South Canyon fire leading to the 1995 Federal Wildland Fire Management Policy, which called for reaffirmation of park fire plans. Parks had plans but they were

⁵² Rothman, 351

⁵³ "Final Report on Fire Management Policy" USDA, DOI May 5, 1989

vague or not being implemented. The 1995 policy required detailed prescriptions and contingency plans in case of wildfires.⁵⁴

In 1995 the National Park Service introduced five member teams known as Prescribed Fire Support Modules to mitigate risks involved with prescription burn programs. These modules are mobile tactical support teams trained exclusively for onsite management of prescribed burns. They specialize in managed burns to the extent that they are unavailable for wildfire response. These modules travel to parks with active burn programs.

Despite the consolidation of suppression resources, the last ten years have seen horrible fire seasons from the deaths of the 1994 season to the 2002 blazes in Southern California that led to numerous fatalities and the destruction of more than 3,500 structures.⁵⁵ During this same time, two new plans were released: the National Fire Plan (NFP) of 2000⁵⁶ and the Review and Update of the 1995 Federal Wildland Fire Management Policy in 2001⁵⁷. The National Fire Plan is simply a reaction to the large fires that have become common during fire seasons. The NFP addresses firefighting safety, rehabilitation of the land, accountability, fuels reduction, and community assistance in the form of education and training. Fire plans of the last decade stress human safety and fuel reduction as a main objective rather than ecological restoration, especially as populations in the WUI continue to rise. The 2001 update was a response to the Cerro Grande fire. It found that the 1995 policy was sound, but that parks were still

⁵⁴ Federal Wildland Fire Policy, available online at <http://www.fs.fed.us/land/wdfire3.htm>, accessed on May 12, 2005.

⁵⁵ Rachel Brittin, "Millions of Fires Burned" *American Forests* 109 (4): 31.

⁵⁶ The National Fire Plan, available online at <http://www.fireplan.gov>, accessed on May 12, 2005.

⁵⁷ National Interagency Fire Center, *Review and Update of the 1995 Federal Wildland Fire Management Policy*, Boise, ID: Bureau of Land Management Office of Fire and Aviation, 2001.

battling the effects of years of suppression and still do not have plans that meet current policy standards.

One problem with fire policy is that while suppression efforts are consolidated for more efficient response to wildfires, preventative plans to treat land remain in the domain of individual parks. These preventative measures do not receive the same resources as suppression efforts. This keeps the fire policy dominantly one of suppression still since individual parks do not have the resources or incentives to update and implement fire plans. There will always be that outlier; that large fire that cannot be forecasted or managed and which uses up large amounts of resources as it spreads across the land. Knowing that an unaccountable large fire is possible keeps fire policy one of fear, and thus one of suppression by default

The National Park Service's fire policy has evolved in a fashion similar to that expected by the punctuated equilibrium theory. A self-defeating policy of wildfire suppression held strong for the better part of century. The new policy regime was created more than thirty years ago, but still many field offices have not implemented the corresponding fire plans. A closer look at how Yosemite National Park's fire plan formed will identify if the punctuated equilibrium pattern is repeated at the park level. Using Yosemite as a case study will also identify what events instigated the change in daily practices at the field office level once the federal policy changed. A catalyst for change was needed at the federal level to approve funding needed for forest management that included fire as part of the plan, but a second catalyst is also needed to implement the new policy at the local level.

Yosemite: A case study of field level operations

During its early history, Yosemite's fire policies were not extraordinary; however, the fire plans created and refined at Yosemite in the 1970's became the foundation for NPS policies that followed. Those policies in turn shaped the federal fire policies throughout public land agencies.

As the original government stewards of the park, the army was charged with protecting the forests from fire. While this duty was understood, it was often out of their hands since there were neither men nor equipment available to actively eradicate fire from the area. Local citizens often lent a hand to fight fires when it threatened their interests. Reports from acting superintendents mentioned that while they tried to control fire, it was an unrealistic objective. The reports also noted that fires were noticed to cause no significant damage to the forests and recommended that the traditional light burning previously done by natives in the area be re-introduced.⁵⁸ The recommendation was not taken.

When the NPS took over control of the land, the ideals of suppression were practiced at Yosemite as much as resources allowed. After twenty years in the Forest Service John D. Coffman visited the park in 1928 as the new NPS fire control expert to take stock of what resources were available and make suggestions that would allow the park to live up to the demands of suppression⁵⁹. Recommendations for equipment were

⁵⁸ Report of the Acting Superintendent and Special Inspector J.W. Zevely recommendations to Secretary of the Interior, 1898. On file in the Yosemite National Park Research Library in the museum in Yosemite Village. Report of the Acting Superintendent Capt. Will Cox, Washington GPO:1899. Report of the Acting Superintendent, Lt. Col. Jos. Garrard, Washington GPO:1903. Report of the Acting Superintendent Capt. H.C. Benson, Washonton GPO:1905.

⁵⁹ John Coffman, interview by Amelia Fry, Bancroft Library, University of California Berkeley Oral History Project, National Park Service, US Dept. of Interior, iii.

made, plans were revised and trainings were held for personnel.⁶⁰ The next year saw a low number of acres burned, illustrating that suppression works when proper resources are available.⁶¹ The following years brought the CCC with all of its resources to Yosemite where suppression efforts were actively pursued. As suppression was the main policy for the NPS, it was also the default policy for Yosemite until the official change of national policy with the release of the Green Book in 1968.

The significant factor that allowed Yosemite to become a future leader in fire policy is its proximity to University of California at Berkeley where Harold Biswell studied fire ecology with his students. Biswell came to California in the late 1940's where he worked with experimental range burning to increase feed for ranchers. He began experimenting with fire in pine forests in Lake and Madera Counties in 1951, and started prescribed burn studies at Sequoia and Kings Canyon National Park with his students in 1965.⁶² Biswell spoke at Yosemite National Park the next year, introducing the park staff to prescribed burn programs. The nearby research and close collaboration between institutions put Yosemite in the right position to take advantage of the change in policy that came in 1968.

At the same time as the federal policy change, Robert Barbee was hired at Yosemite National Park as a resource manager. Barbee had accepted a program offered by the NPS that allowed employees to go back to graduate school in an effort to train them to think along the lines of the Leopold Report. Upon graduation from Colorado State University, he was sent to Yosemite to write the first natural resource management plan. His role as a natural resource manager made him an active figure in prescribed

⁶⁰ John Coffman, Memo for Acting Superintendent Leavitt, July 31, 1928. El Portal Archives.

⁶¹ Leavitt, Superintendent's Annual Reports 1929, El Portal Archive.

⁶² Van Wagtendonk 1995, 12.

burning. He worked in collaboration with personnel at Sequoia-Kings Canyon National Park, Harry Schimke at Stanislaus National Forest, and Harold Biswell. His association with these fire advocates inspired him to make sure that prescribed fire were implemented as part of natural resource management at Yosemite National Park.⁶³

One of Biswell's students, Jan van Wagtendonk, created prescriptions for prescribed burns at Yosemite for his dissertation.⁶⁴ The first prescribed burn plan was included as part of the park's Environmental Restoration Program in 1970.⁶⁵ Van Wagtendonk was hired upon his graduation in 1972 to implement his research and create prescribed natural burn zones and condition requirements under which naturally ignited fires would be allowed to burn. In doing so, van Wagtendonk wrote the agency's first comprehensive prescribed fire plan for Yosemite. The plan included prescribed burns ignited by park personnel to achieve management objectives of ecological restoration. By 1974, 2700 acres had been burned at Yosemite by prescription.

Originally the superintendent and forest managers at the park were not committed to a policy that would release fire amongst their trees. They did not initially welcome Barbee as a newcomer with new ideas that went against tradition forest practices. But as Jim Agee, another one of Biswell's students, mentions in an interview, "Bob (Barbee) really pushed the program...Bob kept pushing, and Bob kept burning."⁶⁶ Barbee was creative about securing resources for the program. When he needed manpower to ensure responsible coverage of a burn he turned to the California Conservation Corps, which is a

⁶³ Robert Barbee, interview with Hal Rothman, November 12, 2004.

⁶⁴ Jan Van Wagtendonk, "Fire and Fuel Relationships in Mixed Conifer Ecosystems of Yosemite" (Ph.D. diss., UC Berkeley, 1972).

⁶⁵ Robert D. Barbee, "Environmental Restoration Program for Yosemite National Park", NPS, DOI:1970.

⁶⁶ Jim Agee, interview with Hal Rothman, June 10, 2004.

program run through the California prison system that supplies other agencies with labor for forest management programs⁶⁷.

The 1974 Starr King fire was considered a success of the prescribed natural fire program. The fire was ignited by lightning in a high elevation part of the park that was designated a prescribed natural fire zone and burned for months. Policy dictated that the fire be allowed to burn itself out unless it came close to the zone boundary or conditions changed making it too dangerous to allow the fire to continue. The Starr King fire approached the fire zone boundary and suppression efforts were used to contain the fire, but not extinguish it. The fire burned itself out a few months later with little damage and no animosity from the public.⁶⁸ Subsequent fires that burned to the edge of the 1974 fire went out due to lack of fuel.⁶⁹ The Starr King fire was considered a success of the prescribed natural fire program.

It was easy to use Yosemite's fire plan as an illustration of success. They had no large fires threaten people or structures at this time.⁷⁰ Prescribed and natural prescribed fires that exemplified the agency's new embrace of fire were burning within conditions and without complaints. Park staff was united behind the policy and educated the public on the importance of fire within the park.

Yosemite continued to lead fire plans with the extent of detail in its prescriptions and responsibilities. As more parks attempted to write their fire plans in accordance with the Green Book, they looked for guidance to the parks that were actively practicing

⁶⁷ Robert Barbee, interview with Hal Rothman, November 4, 2004.

⁶⁸ Jan Van Wagendonk, "Wilderness Fire Management in Yosemite National Park" in *Earthcare: Global Protection of the Fourteenth Biennial Wilderness Conference*. Edited by Edmund A. Schofield (Boulder: Westview Press, 1978) 324-335.

⁶⁹ Jan Van Wagendonk, "Large Fires in Wilderness Areas" (USDA Gen. Tech. Rep. INT-GTR-320, 1993).

⁷⁰ Superintendent William N. Burgen, memo to Regional Director of Western Region, El Portal Work Center/Warehouse, Fire Records. 1977

prescribed burns. As Yosemite's research scientist, Van Wagtendonk was requested to lend expertise to other parks that were forming their own plan.

Yosemite reviewed its fire program in 1977. While prescribed burns were addressed in the Natural Resource Management Plan,⁷¹ the Forest Fire Management Plan⁷² outlined suppression efforts in the park. This division of fire plans demonstrates the division of thinking throughout the agency. Fire was invited back into the park with outlined prescriptions, but suppression was still the fall back policy because suppression still had funding that exceeded that of prescribed burning. The philosophy of prescribed burning was that with enough treatment, future fire management would consist only of protection of people and structures like an urban fire station since natural fires would burn themselves out due to low fuels. However, the funding was not available to truly test if this belief was realistic.

Part of the reluctance to fully engage in an aggressive prescribe fire program was the reaction from the public. A 1975 prescribed fire burned for three months, much longer than had been planned. Despite the fact that no people or communities were threatened, the smoke did cause some alarm among local residents.⁷³ The park staff knew that public backing was significant to the program and used education efforts to keep visitors aware of fire plans and ecology. In the 1979 Natural, Conditional, and Prescribed Fire Management Plan, Van Wagtendonk mentions how cluttered forests inhibit visitor enjoyment, thus tying park guests to resource management. Significant tourist attractants were given a higher level of fire protection. For instance, the Grizzly

⁷¹ Yosemite National Park Natural Resource Management Plan and Environmental Assessment, El Portal Work Center/Warehouse, Fire Records. 1977 .

⁷² Forest Fire Management Plan Revised. El Portal Work Center/Warehouse, Fire Records. 1977

⁷³ Letter to Rep. BF Sisk from Super Leslie Arnberger El Portal Work Center/Warehouse, Fire Records. 1975.

Giant in the Mariposa Grove was afforded permanent protection from burns and scars. Many of the Sequoias were allowed only a small amount of scarring so that visitors would not worry about blackened marks on the trees they had traveled so far to marvel.⁷⁴

Due to the distance and difference between parks, there was a certain amount of autonomy and decentralized organization in the national parks. However, Yosemite depended on interagency suppression efforts during Labor Day weekend in 1987 with the Stanislaus Complex Fire. The fire started in the adjacent forest lands but threatened park land and nearby communities of El Portal and Foresta, so park staff was sent to fight that fire in addition to the fires burning concurrently within the park. A large mobilization effort was provided by the Boise Interagency Fire Center to contain the fire.

The dry conditions of 1987 caused more fire activity in the park than any other time in park history. Prescribed burns were cancelled for the '87 and '88 seasons⁷⁵. The drought conditions were prevalent throughout the West and resulted in the catastrophic fires in Yellowstone. While the Yellowstone fires were under review, all prescribed natural fires were suppressed throughout the National Park Service. Despite the scrutiny placed on the NPS, Yosemite went ahead with its prescribed burn plans 1989, and was one of only three parks back online with prescribed natural fires in 1990⁷⁶. While the rest of service was timid about allowing fires to burn in the parks, Yosemite, Sequoia and Kings Canyon National Parks were responsible for 95% of the prescribed natural burns in

⁷⁴ Super John Morehead, "letter to Norman Christensen at Duke University" El Portal Work Center/Warehouse, Fire Records. 1986.

⁷⁵ 1992 Cumulative Record of Prescribed Burns-Yosemite National Park. Dates from 1970 to 1991. El Portal archives. Y1421 1992.

⁷⁶ Jan van Wagendonk, "Large Fires in Wilderness Areas", Gen.Tech. Rep. INT-GTR-320, Ogden, UT, 1993. David J. Parsons and Stephen J. Botti, "Restoration of Fire in National Parks", Gen. Tech. Rep. INT-GTR-341.

the park service from 1988 to 1992.⁷⁷ This commitment to the fire program distinguished Yosemite from other parks.

In 1990, Yosemite experienced its own version of the Yellowstone conflagration that had occurred two years earlier. A lightning strike ignited the A-Rock fire and because of the experience in Yellowstone, suppression efforts were immediately called into action at Yosemite. These suppressive measures were ineffective at containing the fire due to dry conditions and winds. Yosemite Valley and El Portal were evacuated and the park was closed for the first time in its history. Over 18,000 acres were burned, including several structures.⁷⁸ This was a highly publicized event, but it did not diminish Yosemite's commitment to restoring fire to the land. The 1994 Draft Statement for Management⁷⁹ illustrated the park's continued dedication by zoning 80% of the park for conditional burning.

The Draft Statement for Management did raise a concern that air quality regulations would dampen the fire program. The current Fire Management Plan for Yosemite National Park completed in 2004⁸⁰ repeats this concern that compliance with local and state air quality standards restricts fire policies. Open communication lines for public education and feedback are used to mitigate visitor concerns.

The increasing populations along the wilderness fringe areas raise additional concerns. Using prescribed fire to treat fuel loads in these areas risks structure and

⁷⁷ Bruce M. Kilgore and Tom Nichols, "National Park Service Fire Policies and Programs," in James K. Brown, Robert W. Mutch, Charles W. Spoon, and Ronald H. Wakimoto, "Proceedings: Symposium on Fire in Wilderness and Park Management," (Missoula: USDA Forest Service, General Technical Report, INT-GTR-320, 1995), 24-27.

⁷⁸ National Park Service, Western Region "Yosemite Fires, 1990". El Portal Work Center/Warehouse, Fire Records. 1990.

⁷⁹ 1994 Draft Statement Management, YNP, NPS, DOI

⁸⁰ Final Yosemite Fire Management Plan and Environmental Impact Statement (<http://www.nps.gov/yose/planning/fire/>) accessed May 12, 2005.

human safety. The 2004 plan requires mechanically thinning developed areas before, or as a substitute to, burning in order to reduce the risk to lives or property. However, it does not support the Healthy Forest Initiative⁸¹ that allows sales of these materials to support the efforts. It also states that no new roads will be built for access to the park interior for fire response or fuel reductions.

Yosemite National Park remains a leader in fire management policy and research over thirty years after the Green Book authorized it to restore fire to the ecosystem. Federal policy reviews of the last decade have urged parks to reaffirm and strengthen their fire plans while citing Yosemite as an example of a compliant park. Despite the 1990 A-Rock fire, Yosemite has not had a fire threat challenge its commitment to fire restoration in the park. Yosemite's impetus to initiate its fire plan and keep it thriving came from the government and education research institutions located nearby in Berkeley. Yosemite highlights the ecological importance of fire while maintaining public safety rather than stressing fuel reduction as the key significance of the plan.

⁸¹ Healthy Forests Restoration Act of 2003. Public Law 108-148, December 2003.

CHAPTER 4

DISCUSSION

This section describes the patterns illustrated in the policy histories described above and compares them to the pattern of punctuated equilibrium. The catalysts that caused the jumps to new equilibrium are identified and discussed.

Federal Fire Policy

The federal fire policy evolution does follow the punctuated equilibrium pattern. The federal policy pattern is illustrated in Figure 2 with the policy of suppression shown as the original equilibrium and fire management plans that include fire as the new equilibrium. In order for a policy to reach equilibrium, policy institutions and monopolies must be in place to reinforce that course of action in the face of resistance.

The Forest Service created a policy monopoly for fire suppression with acts of Congress that established institutional arrangements and networks that controlled funding for forestry research and management under the condition that fire was to be excluded completely. The bureaucratic organization of the agencies gave the policy momentum. Personnel in land management agencies came from similar training backgrounds that focused on timber production rather than forest ecology. Public campaigns, like Smokey Bear, further justified the mission of extinguishing every fire on public lands. While

Federal Level Punctuated Equilibrium Pattern

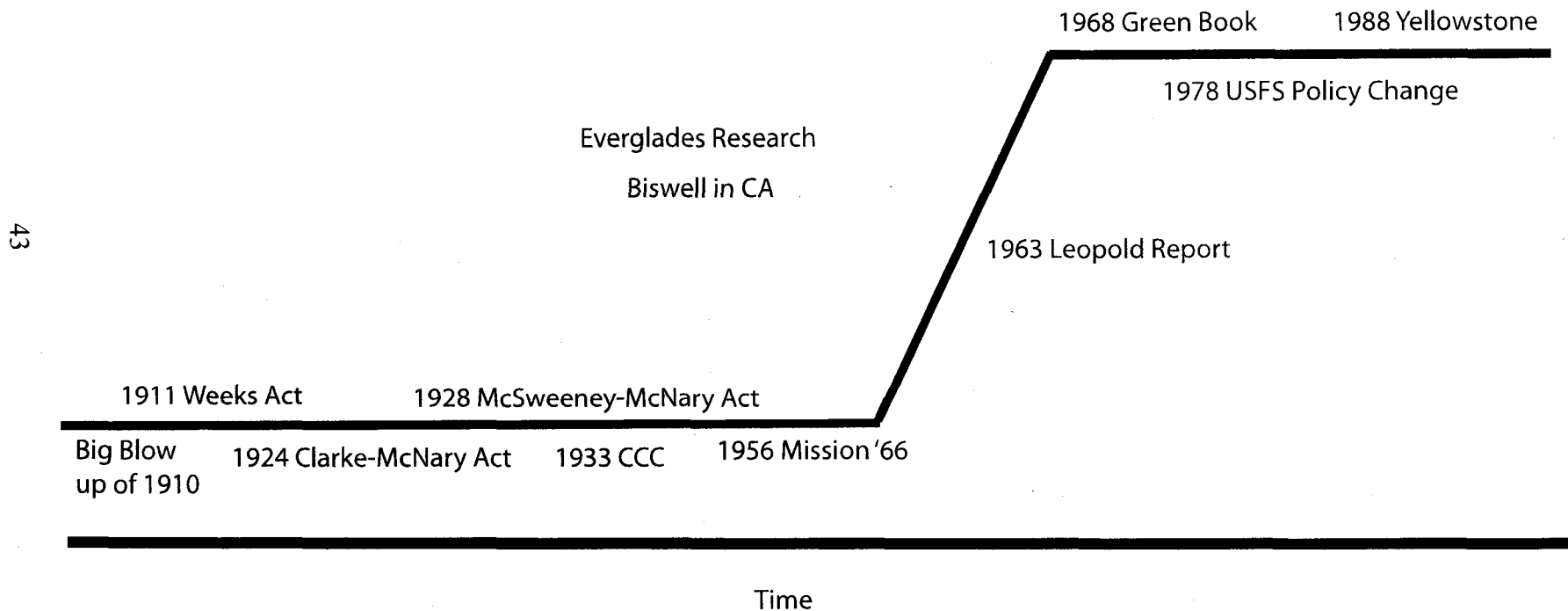


Figure 2. Pattern of the NPS Fire Policy Evolution

suppression was not a practical policy for the long term, appropriations from Congress and programs like the CCC and Mission 66 did make the policies economically feasible.

The punctuated change in policy occurred within the National Park Service. The differing missions of the agencies were significant. While the Forest Service was preoccupied with protecting the trees, the National Park Service's wildlife division began viewing the forests from a more holistic lens provided by the Leopold Report. The publicly supported experimental burns in Florida and Biswell's burns in California proved that burns could be beneficial and manageable. The enthusiasm from these researchers and the scholarship they produced were catalysts for a drastic policy change.

The punctuation resulted in a new policy that requires the inclusion of fire as part of a management plan in areas that have historically experienced fire disturbances. The new policy has been scrutinized and shown to be supported by new policy networks; proving that it is at a new equilibrium.

Scrutinizing process was motivated by the risk of prescribed burning. Prescribed fires have resulted in several high profile fires over the last decade. The fires were followed by reviews of the federal policies that authorized and encouraged the purposeful setting of fire by land managers. The 1989 Final Report of Fire Management Policy, a response to the 1988 Yellowstone fires that grew from prescribed natural fires, and stood by the policy that prescribed burns were a sound treatment option for areas with excessive fuel loads. The report also highlighted parks like Yosemite, with its burn treatment policies, as benchmarks for other park superintendents. The 1995 Federal Wildland Fire Policy released by the National Interagency Fire Center expanded the policy to all federally managed lands by stating that the use of fire should be used as a

tool for land management. The 2000 National Fire Plan increases the options available for fuel treatment to include mechanical, chemical, or biological control methods in addition to fire, but fire is still a necessary step as part of the ecological restoration process. A review and update of the 1995 policy was called for in reaction to the 2000 Cerro Grande fire in New Mexico. This fire grew from a prescribed burn that escaped the control of the fire managers onsite. Although the escaped fire demonstrated the great risk that can come from prescription programs, the updated federal policy continued to support the notion that prescribed burn programs were “sound.” The risk of losing control of burns was due to the result of the suppression policy that prescribed burn programs were designed to correct.

In addition to the standing up to these investigations, new policy institutions were created that supported the developing policy. The Prescribed Fire Support Modules created specifically to aid prescription burn programs are an example of these programs. The interagency organization of the federal fire plan through the National Interagency Fire Center and the National Wildfire Coordinating Group strengthened the policy network, and made the National Park Service’s fire policies repeated throughout the nation. In addition to the National Park Service, the other land management agencies cooperating through these organizations include: the Forest Service, the Bureau of Land Management, the Bureau of Indian Affairs, the Fish and Wildlife Service, the National Association of State Foresters, and the Federal Emergency Management Agency.

These institutional arrangements allow for program funding and interagency cooperation, which reinforce the new policy of fuel management and resists arguments

for alternative policies thus indicating that the new policy has reached a stable equilibrium, which has lasted for over 30 years.

Yosemite's Fire Policy

Yosemite's policy evolution also follows a punctuated equilibrium pattern, as shown in Figure 3. Yosemite's management policies were established following the problem definition of suppression prior to the 1970's, so the original policy equilibrium is the same for both policy histories; however, the catalysts for the punctuations differ between the two levels of the agency's organization.

The official change in governing policy was released in 1968, but there was neither infrastructure nor expertise in place at Yosemite to take advantage of this change. However, the policy change did open a few doors for Yosemite. It allowed access to the park for local researchers from the University of California to do experimental burns, and it opened a position for Robert Barbee who would be a significant agent in implementing the policy. Barbee made sure there were resources to allow for safe burns and used professional networks to build a local coalition for prescribe burning. With colleagues, Barbee held fire demonstrations for media and professionals and the public. These demonstrations acted as educational tools to dissuade any opposition or fear.

The university research led to the placement of Jan van Wagtendonk, who would not only have the knowledge to create a prescribed burn plan, but who would also continue to sustain the policy. The presence of the expertise, along with a supportive supervisor, instigated the change in park practices.

Park Level Punctuated Equilibrium Pattern

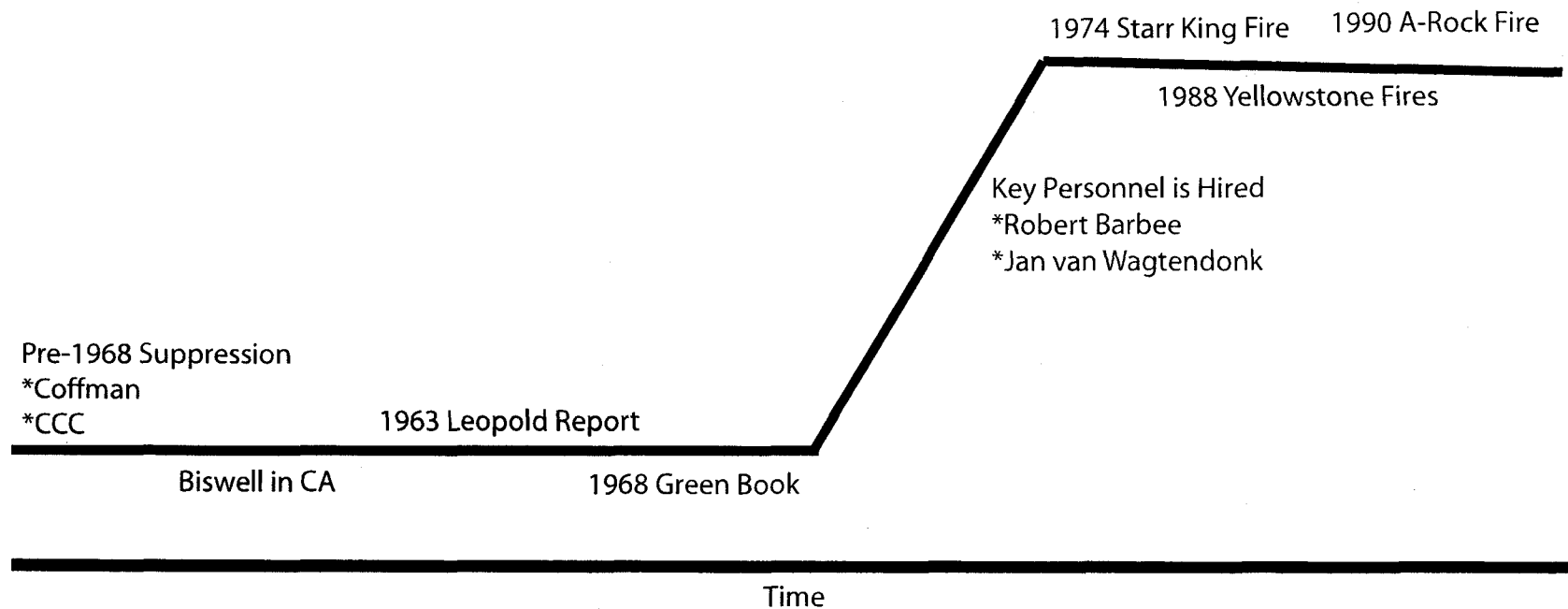


Figure 3. Pattern of Yosemite Fire Policy Evolution

Supporting institutions for the new policy at Yosemite include the interpretive plans that work similar to the Smokey Bear campaigns of the last century. Visitor and stakeholder education programs are part of the fire management plan.⁸² The first prescribed burns were done in the Valley in full view of the visitors. By putting the fires in the public's view, Yosemite invited questions that would lead to informed answers that would assure the public that fire belonged in the park.

The legacy of being a fire park has separated Yosemite from other national parks, which has created the political momentum to sustain the program. New superintendents to the park have an infrastructure in place that allows them to continue the process of securing funds and approving burns. No new catalyst is needed to maintain the program since it has reached equilibrium.

The stability of the policy was tested when the entire National Park Service's fire policies were scrutinized following the Yellowstone fires. While the Yellowstone fires gained notoriety much like the 1910 fires, they had little effect on the policies at Yosemite National Park. At the time, all prescribed natural fires were disallowed until individual park fire plans could be reviewed and updated. Yosemite's fire plan was one of the first approved, and prescribed natural fires and prescribed burns continued without interruption.⁸³ Jan van Wagtenonk confirmed in a phone interview that while conditions for burns did become stricter, the Yellowstone fires had no impact on the Yosemite fire program.⁸⁴

⁸² Yosemite Fire Management Program accessed at <http://www.nps.gov/yose/planning/fire/> on June 5th, 2005.

⁸³ Final Report on Fire Management Policy 1989; paper stating pb that continued. Jan van Wagtenonk, "Large Fires in Wilderness Areas. 1995 Gen Tech Rep INT_GTR_320.

⁸⁴ Jan van Wagtenonk, phone interview with author on August 8th, 2005.

Yosemite fire policy also matches the punctuated equilibrium pattern as shown in Figure 3. While suppression is also represented as the initial equilibrium in this figure as it was in Figure 2 for the federal fire policy, a different set of events is shown to instigate the change in park practices, only beginning with the 1968 change in federal policy. The catalyst for change at the park level was brought about through new personnel who were enthusiastically motivated and had the necessary expertise needed to implement the policy change. Once park practices changed to include the implementation of the new plan, the organizational momentum of policy maintained that plan as a new equilibrium.

CHAPTER 5

CONCLUSION

The punctuated equilibrium model of policy evolution describes this case of fire policy on public lands. Moreover, the punctuated equilibrium pattern can be seen at both federal and local levels. Punctuated Equilibrium occurs regardless of the size or scope of the organization, but separate catalysts to cause change at the different level of organization are needed.

Significant catalysts at the local level include personal preference of field level managers to recruit the expertise needed to develop an infrastructure that will implement and maintain the practices required to fulfill the new policy. The park superintendent is also important for securing fuel treatment resources from larger agency funding pools. Without a motivated supervisor, burn plans would quickly wither for lack of resources. When a new policy is created for an agency, motivation for the park-level managers should also be created to insure the policy is implemented in daily practices. That motivation can be supplied through promotions and/or transfers to parks needed to implement the policy. Sufficient funds need to be available to these managers assuming that all the parks will follow the new directive. If there are only enough funds in FIREPRO for a few parks to have active burn plans, it follows reason that the other parks do not have to implement programs since there aren't funds available. Appropriating

sufficient funds communicates to supervisor's that this is not a symbolic policy, but an actual order for the agency director.

While support from local citizens or constituency groups did not provide the impetus for a change in park practices at Yosemite, citizen groups did not block burn programs as seen in other parks. This support can be attributed to the comprehensive educational component of Yosemite's fire plan or to the fact that the park has not yet experienced a burn on the same scale as Yellowstone's 1988 fires.

Future work with policy evolution patterns should continue to do case study analyses of other parks with differing levels of activity in their burns plans to identify which catalysts have changed policies at the different sites. Additionally, one could look at sites where a change in park practices was initiated but failed to see what obstacles inhibit potential catalysts for change. Use of land, mission of agency, personnel, and public involvement should still be looked at in these cases to determine their involvement in policy evolution or stagnation.

Recommendations for implementing policies quickly would have to take into consideration these future studies that identify the catalysts for park level policy change. It is significant to note that influences from outside the agency were crucial in creating the punctuation in both case studies discussed in this paper. If future studies illustrate that involvement from local organizations is consistent with policy implementation, then higher level managers will need to incorporate public involvement into the policy structure. There are several ways in which the public can get involved in agency planning through NEPA scoping periods and stakeholder meetings, but there must be an active

local organization for these events to work. Perhaps there should be some form of incentive in the policy itself that would enroll from local institutions and civil groups.

Yosemite was case where fire plans were spread out to the rest of the National Park Service laterally rather than from top down. Instead of a directive from higher level managers, Yosemite's plans were used as a template and modeled to fit other parks. The plan was adapted as it was shown to be a success and the expertise and budgeting for it made clear to other parks. It would be worth trying to see if plans should be implemented through "flagship" parks. Send a directive that one park must implement the plan. Give that park resources, personnel, etc. to make implementation possible. That park can work the application of the policy and organizational infrastructure needed to put the policy into practice. Once the foundation for the policy is set, it can be shared with other parks. There would be some time delay, but this method might get a policy in place faster.

REFERENCE LIST

- "1992 Cumulative Record of Prescribed Burns-Yosemite National Park." El Portal Archives, Y1421 1992.
- "1994 Draft Statement Management," YNP, NPS, DOI 1994.
- Agee, Jim. Interview with Hal Rothman, June 10, 2004.
- Arnberger , Leslie. "Letter to Rep. BF Sisk." El Portal Work Center/Warehouse, Fire Records. 1975.
- Arno, Stephen and Steven Allison-Bunnell, *Flames in Our Forest: Disaster or Renewal?* (Washington, D.C.: Island Press, 2002).
- Barbee, Robert D. "Environmental Restoration Program for Yosemite National Park", NPS, DOI:1970.
- Barbee, Robert D. interview with Hal Rothman, November 12, 2004.
- Barnard, Charles. "The Economy of Incentives", in Classics of Organization Theory, eds. Jay M. Shafritz and J. Steven Ott (Belmont: Wadsworth, 2001).
- Benson, Capt. H. C. "Report of the Acting Superintendent," Washington GPO:1905.
- Brittin, Rachel. "Millions of Fires Burned" *American Forests* 109 (4): 31."
- Burgen, William N. memo to Regional Director of Western Region, El Portal Archives, Fire Records. 1977
- Busenberg, George. "Innovation, Learning, and Policy Evolution in Hazardous Systems", *American Behavioral Scientist*, 44 no. 4 (2000).
- Carle, David. Burning Questions: America's Fight With Nature's Fire. Westport: Praeger Publishers, 2002.
- Clarke-McNary Act. 16 U.S.C. 568 Public Law 68-270. June 7, 1924
- Clary, David. Timber and the Forest Service (Lawrence: University Press of Kansas, 1986).

Coffman, John D. Interview by Amelia Fry, Bancroft Library, University of California Berkeley Oral History Project, National Park Service, US Dept. of Interior.

---Memo for Acting Superintendent Leavitt, July 31, 1928. El Portal Archives.

Cox, Will. "Report of the Acting Superintendent," Washington GPO:1899.

"Federal Wildland Fire Policy," available online at <http://www.fs.fed.us/land/wdfire3.htm>, accessed on May 12, 2005.

"Final Report on Fire Management Policy" USDA, DOI 1989.

"Final Yosemite Fire Management Plan and Environmental Impact Statement" available online at <http://www.nps.gov/yose/planning/fire/> accessed May 12, 2005.

"Forest Fire Management Plan Revised." El Portal Work Center/Warehouse, Fire Records. 1977

Garrard, Jos. "Report of the Acting Superintendent," Washington GPO:1903.

Graves, Henry S. "A Policy of Forestry for the Nation." U.S. Dept. of Agriculture Circular 148 (Washington, D.C.: Government Printing Office, 1919).

"Healthy Forests Restoration Act of 2003." Public Law 108-148, December 2003.

Hesseln, Hayley, John B Loomis, Armando Gonzalez-Caban, and Susan Alexander, "Wildfire effects on hiking and biking demand in New Mexico: a travel cost study." Journal of Environmental Management, 69 (2003) 359-368

"Historical Wildland Fire Statistics" available on the National Interagency Fire Center website at <http://www.nifc.gov/stats/historicalstats.html> accessed on 12 April 2004.

John, Peter. "Is there Life After Policy Streams, Advocacy Coalitions, and Punctuations: Using Evolutionary Theory to Explain Policy Change?" The Policy Studies Journal 31(2003): 481-96.

Kaufman, Herbert. The Forest Ranger. John Hopkins Press. 1960.

Kilgore, Bruce M. and Tom Nichols, "National Park Service Fire Policies and Programs," in James K. Brown, Robert W. Mutch, Charles W. Spoon, and Ronald H. Wakimoto, Proceedings: Symposium on Fire in Wilderness and Park Management, Missoula: USDA Forest Service, General Technical Report, INT-GTR-320, 1995.

Leavitt, E.P. "Superintendent's Annual Reports 1929," El Portal Archive.

- Leopold, A. Starker, et al. "Wildlife Management in the National Parks," in Transactions of the Twenty-Eighth North American Wildlife and Natural Resources Conference, ed. James B. Trerethen (Washington, D.C.: Wildlife Management Institute, 1963) 29-45."
- Linblum, Charles. "The Science of 'Muddling Through.'" Public Administration Review 19 (1959):79-88.
- Lipsky, Michael. "Street Level Bureaucrats as Policy Makers", The Political Environment of Public Management, (San Francisco: Addison-Wesley) 89-100.
- Lipsky, Michael. "Street-Level Bureaucracy: The Critical Role of the Street-Level Bureaucrats" in Classics of Public Administration, eds. Jay M. Shafritz and Albert C. Hyde (San Diego: Harcourt Brace, 1997) 401-408.
- Loomis, John B., J Englin, and Armando Gonzalez-Caban, "Effects of fire on the economic value of forest recreation in the intermountain west: preliminary results," USDA Forest Service Gen-Tech-Rep. PSW-GTR-173, 1999.
- McSweeney-McNary Act of 1928. 16 U.S.C. 581
- Merrill, Perry H. Roosevelt's Forest Army: A History of the Civilian Conservation Corps (Barre: Northlight Studio Press, Inc., 1981) 42-53.
- Merton, Robert K. "Bureaucratic Structure and Personality" in Classics of Public Administration. Eds. Jay M. Shafritz and Albert C. Hyde (Orlando: Harcourt Brace and Company) 100
- Morehead, John. "Letter to Norman Christensen at Duke University" El Portal Archive, Fire Records. 1986.
- National Fire Plan, available online at <http://www.fireplan.gov>, accessed on May 12, 2005.
- National Interagency Fire Center website, "Mission and History of the National Interagency Fire Center," <http://www.nifc.gov/nifcmiss.html>, accessed on 16 March 2005.
- National Interagency Fire Center, "Review and Update of the 1995 Federal Wildland Fire Management Policy," Boise, ID: Bureau of Land Management Office of Fire and Aviation, 2001.
- National Park Service Reference Manual 18: Wildland Fire Management, Chapter 17: FIREPRO Analysis, available online at http://www.nps.gov/fire/download/fir_wil_rm18_ch17.pdf, accessed 20 April 2005.

- National Park Service, Western Region "Yosemite Fires, 1990". El Portal Archive, Fire Records. 1990.
- NEPA Act of 1969. Public Law 91-190 (42 U.S. C. 4321-4347) January 1, 1970.
- Olson, Cordon C. "A History of Natural Resource Management within the National Park Service," (thesis, Slippery Rock University, 1986).
- Parsons, David J. and Stephen J. Botti, "Restoration of Fire in National Parks", Gen. Tech. Rep. INT-GTR-341.
- Pinchot, Gifford. The Use of the National Forest Reserves: Regulations and Instructions (Washington, D.C.: Government Printing Office, 1905)
- Public Law 60-136, May 23, 1908. 16 U.S.C. 500, 553, 556d
- Pyne, Stephen J. Fire in America: A Cultural History of Wildland and Rural Fire, (Princeton: Princeton University Press, 1982).
- Pyne, Stephen J., Patricia L. Andrews and Richard D. Laven, Introduction to Wildland Fire (New York: John Wiley & Sons, Inc., 1996).
- Reference Manual 18: Wildland and Prescribed Fire Management Policy, Chapter 17: FIREPRO Analysis, available online at http://www.nps.gov/fire/download/fir_wil_rm18_ch17.pdf accessed 8/16/05.
- Ross W. Gorte, National Forests: Current Issues and Perspectives (Hauppauge: Nova Science Publishers, Inc., 2003) 136.
- Rothman, Hal. manuscript for A Test of Adversity and Strength: Wildland Fire in the National Park System, (forthcoming administrative history, NPS) 91.
- Schweizer, Debra. email to author, 13 July 2005.
- Steen, Harold K. "The Origins and Purposes of the National Forests" in Public Lands, Public Heritage: The National Forest Idea by Alfred Runte. Niwot, CO: Roberts Rinehart Publishers, 1991.
- Trachtman, Paul. "Fire Fight", Smithsonian, 34 (5):42-51.
- True, James L, Bryan D. Jones, and Frank R. Baumgartner, "Punctuated-Equilibrium Theory: Explaining Stability and Change in American Policymaking," in Theories of the Policy Process, ed. Paul A Sabatier (Boulder: Westview Press, 1999), 91-113.

- van Wagtendonk, Jan. "Dr. Biswell's Influence on the Development of Prescribed Burning in California," (USDA Forest Service, Gen. Tech. Rep. PSW-GTR-158, 1995) 12.
- "Fire and Fuel Relationships in Mixed Conifer Ecosystems of Yosemite" (Ph.D. dissertation, UC Berkeley, 1972)."
- "Large Fires in Wilderness Areas" (USDA Gen. Tech. Rep. INT-GTR-320, 1993).
- phone interview with author on August 8th, 2005.
- "Wilderness Fire Management in Yosemite National Park" in *Earthcare: Global Protection of the Fourteenth Biennial Wilderness Conference*. Edited by Edmund A. Schofield (Boulder: Westview Press, 1978) 324-335.
- Warner, Dewey. interview with author, 6 February 2004.
- Weeks Law, 16 U.S.C. 563 Public Law 108-198, March 1, 1911
- Wilderness Act, Public Law 88-577 (16 U.S. C. 1131-1136) September 3, 1964.
- Yin, Robert K. Applications of Case Study Research (Thousand Oaks: Sage Publications, 2003) 3-27.
- Yosemite Fire Management Program accessed at <http://www.nps.gov/yose/planning/fire/> on June 5th, 2005
- Yosemite National Park Natural Resource Management Plan and Environmental Assessment, El Portal Work Center/Warehouse, Fire Records. 1977.
- Zevely, J.W. "Report of the Acting Superintendent and Special Inspector recommendations to Secretary of the Interior, 1898. On file in the Yosemite National Park Research Library in the museum in Yosemite Village.

VITA

Graduate College
University of Nevada, Las Vegas

Tricia Mynster

Home Address:

1050 Whitney Ranch Dr. #1225
Henderson, NV 89014

Degrees:

Bachelor of Science, Earth Systems Science & Policy, 2001
California State University, Monterey Bay

Thesis Title: The Punctuated Equilibrium Model of Policy Evolution:
an Explanation for US Federal Fire Policy Change

Thesis Examination Committee:

Chairperson, Dr. David Hassenzahl, Ph.D.
Committee Member, Dr. Timothy Farnham, Ph.D.
Committee Member, Dr. Hal Rothman, Ph.D.
Graduate Faculty Representative, Dr. Robert Futrell, Ph.D.