Policy-Oriented Learning Among National Forest Stakeholders in the Pacific Northwest: Changes in Policy Beliefs Since Adoption of the Northwest Forest Plan

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Abstract

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This study evaluates whether national forests stakeholders in the Pacific Northwest region of the United States have changed their national forest policy beliefs since adoption of the 1994 Northwest Forest Plan, and describes the extent to which scientific and technical information influences the revision of policy beliefs. The study tested assumptions of the Advocacy Coalition Framework (ACF) regarding the propensity for belief change, or policy-oriented learning, to occur in policy subsystems where conflict is intermediate and scientific information is widely available.

Semi-structured interviews with 20 individuals with long-term histories of involvement in regional national forest policy issues were conducted and analyzed. Interviewees were sorted into three advocacy coalitions: an amenity coalition most concerned with forest preservation, a commodity coalition most concerned with timber production, and a scientific management coalition most concerned with maximizing agency discretion and applying scientific expertise in management decisions. The majority of interviewees (80%) revised policy beliefs, however policy belief change results varied by advocacy coalition. Out of those who changed policy beliefs, 68.8% of individuals indicated revision of more than one policy belief. 71% of those who revised policy core beliefs also revised secondary beliefs while only 36% of participants who revised secondary beliefs also revised policy core beliefs. Furthermore, the study reveals instances of policy belief affirmation and examples of the absence of learning. Scientific information is not found to be a major influence upon policy-oriented learning. Instead, most interviewees attributed belief change to conflict resolution, experience with policy implementation, and the perception of environmental or social conditions.

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1. Introduction

In 1993, President Clinton attempted to resolve intense conflict over the values, goods, and services for which Pacific Northwestern national forests[1] were managed. He convened an interdisciplinary team of scientists to develop an ecosystem management plan for over 20 million acres of federal forest lands in the Pacific Northwest (Yaffee, 1994). The result of this effort was the 1994 Northwest Forest Plan (NWFP), a policy framework that fundamentally and functionally altered federal forest management by shifting the primary management goals from providing a sustained yield of timber to conserving biodiversity, particularly endangered species (Thomas, Franklin, Gordon, & Johnson, 2006). The NWFP was envisioned as a scientifically-informed management plan that also included an adaptive management component intended to test the validity of assumptions underlying the plan's policy and management direction (Philpot, Stankey, & Clark, 2006).

This study applies the Advocacy Coalition Framework (ACF), a theory of the policy system developed by Paul Sabatier (Jenkins-Smith et al., 2014) to assess policy belief change among stakeholders whose history of involvement with regional national forest policy spans to at least the late 1980s, preceding the adoption of the Northwest Forest Plan. Through qualitative inquiry, I explored whether stakeholders have changed their policy beliefs and to what extent belief change was influenced by the availability of scientific research or technical information.

[1] For the purposes of this research, the term "Pacific Northwest national forests" includes 19 national forests in Washington, Oregon, and Northern California whose Forest Land Management Plans were amended by the 1994 Northwest Forest Plan, discussed further in section 3.2.

My work to examine policy-oriented learning tested the following ACF hypothesis (Jenkins-Smith et al., 2014):

> "Policy-oriented learning across belief systems is most likely when there is an intermediate level of informed conflict between the two coalitions. This requires that (1) each have the technical resources to engage in debate, and (2) the conflict be between secondary aspects of one belief system and core elements of the other or, alternatively, between important secondary aspects of the two belief systems."

The research questions are as follows:

1. Have stakeholders changed their policy core and/or secondary policy beliefs about Pacific Northwest national forest management policy since adoption of the Northwest Forest Plan?
2. If beliefs changed, did actors change their policy core and/or secondary policy beliefs in light of new scientific or technical information?

Stakeholder belief systems are important for three primary reasons. First, environmental conflicts arise from fundamental differences in values between stakeholders (Nie, 2008). Values, at the core of an individual's belief system, drive the formation of alliances between those that seek to influence policy outcomes (Jenkins-Smith, Nohrstedt, & Weible, 2014). Second, actors' beliefs about the causes of problems and the appropriateness of solutions ultimately determine the design of public policy (Layzer, 2002; Jenkins-Smith et al., 2014). Third, while deep-seated core beliefs may remain constant, beliefs about problems, solutions, and appropriate policy strategies may respond to new information and conditions (Jenkins-Smith et al., 2014). Therefore, changes in beliefs may be a proxy for learning.

In the realm of public policy studies, learning is the process of updating one's beliefs about the elements of policy as a result of analysis of new information and/or social interaction (Radaelli, 2009). Learning is important in dynamic policy arenas where technical developments

require an up-to-date understanding of policy problems (Jenkins-Smith & Sabatier, 1993). Moreover, learning shapes an actor's preferences for policy solutions that may ultimately be translated into policy change (Heikklila & Gerlak, 2013).

As national forests throughout the Pacific Northwest prepare to update their national forest management plans, stakeholders will be revisiting policies put in place by the Northwest Forest Plan that have shaped forest management for the past 25 years. At this juncture, it is important to understand the belief transformations that have (or have not) taken place over the past 25 years. By illuminating the influences affecting belief change, and providing insight into policy preferences and beliefs, we can better understand and respond to the influences that may shape pending national forest management plan revisions in the Pacific Northwest. To the extent that belief change has occurred among stakeholders, we can expect that stakeholders will advocate for changes to national forest management policy.

1.2 Thesis Overview

The thesis is organized into six chapters. The first chapter provides an introduction to the study and the purpose of the research. The second chapter reviews scholarly literature related to national forest management and introduces the theoretical framework for this study, the Advocacy Coalition Framework (ACF), and the rationale for using the ACF. Chapter three introduces the case study, describing the setting and background of national forest policy conflicts in the Pacific Northwest and providing context for the major policy change that occurred with adoption of the NWFP. The following chapter provides a rationale for the research design and methods and discusses inherent limitations of the methodology. Chapter five provides

the research findings. The final chapter discusses the findings in the context of the ACF and recommends additional research related to applications of the ACF.

2. Literature Review

The literature review provides an overview of the the Advocacy Coalition Framework (ACF), which is the theoretical framework examined in the study, the concept of policy-oriented learning, and the role of scientific information and conflict resolution in influencing belief change. The chapter also includes findings from previous ACF studies in national forest policy subsystems. Finally, the chapter identifies several opportunities for this study to contribute to ACF literature.

2.1 The Advocacy Coalition Framework

The Advocacy Coalition Framework (ACF) is an explanatory theory of the policy process introduced by Paul A. Sabatier in the early 1980s (Jenkins-Smith et al., 2014). The ACF models the effect of policy-oriented learning among actors within advocacy coalitions (Jenkins-Smith et al., 2014). Policy-oriented learning is described as the "shifting beliefs about the nature of policy issues, their causes and likely solutions" (Henry & Dietz, 2012). Advocacy coalitions consist of individuals and actors from a variety of agencies and organizations within a policy subsystem who share a belief system and demonstrate a non-trivial degree of coordination over time to address a particular policy issue (Jenkins-Smith et al., 2014). The interactions among coalitions, negotiations between and within them, and subsequent policy learning that occurs over time can greatly influence the political process and affect policy change (Sabatier & Jenkins, 1999).

The ACF relies on a number of key assumptions (Jenkins-Smith et al., 2014):

1. Understanding the policy change process requires a time perspective of at least a decade;

2. Policy subsystems, defined as a substantive issue area within a specific geographic location, are the most practical unit of analysis for policy change over time;

3. Policy change is primarily driven by individuals, not organizations, who are motivated by goals but whose rationality is limited by experience and information and biased by a simplified belief system;

4. Actors within a subsystem can be aggregated into one or more coalitions based on shared beliefs and coordination strategies;

5. Public policies and programs reflect the values and belief system of their designers; and

6. Understanding how scientific and technical information is assimilated (or deflected) from belief systems can illuminate one's understanding of the policy process.

The ACF describes four major pathways to policy change: 1) external shocks to the conditions of the policy subsystem such as crises or major socioeconomic shifts, 2) events internal to the subsystem such as scandals or policy failures, 3) negotiated agreements between warring coalitions, and 4) policy-oriented learning. Although the ACF considers multiple inputs into the policy process, this study will focus on policy-oriented learning, in particular, the role of individual belief change over time.

2.2 The Hierarchy of Policy Beliefs

The ACF conceptualizes beliefs with a hierarchical structure composed of three tiers: deep core beliefs, policy core beliefs, and secondary beliefs (Table 1). Causal relationships between types of policy beliefs are described in terms of scope. Deep core beliefs are far-reaching and span beyond a policy subsystem, molding and constraining policy core beliefs (which are specific to a subsystem), which in turn influence adoption of more narrow secondary

beliefs (which address a specific aspect of policy, therefore are less than subsystem-wide) (Henry & Dietz, 2012).

Table 1 - ACF Policy Belief Characteristics

Adapted from Matti & Sandström (2011) and Sabatier and Jenkins-Smith (1999).

	Deep Core	**Policy Core**	**Secondary Aspects**
Qualities	Fundamental normative and ontological axioms	Fundamental policy positions concerning basic strategies for achieving core values within the subsystem	Instrumental decisions necessary to implement policy core
Scope	Applicable to multiple subsystems	Subsystem-wide	Less than subsystem-wide
Susceptibility to change	Difficult, akin to a religious conversion	Difficult but possible if experience or new information reveals serious anomalies	Moderately malleable – the topic of most administrative and legislative policymaking
Select illustrative components	• Beliefs regarding human nature and fundamental relationships with the environment • Political ideology • Sociocultural identity • Beliefs regarding distributive justice • Priorities of ultimate values: freedom, security, power, knowledge, health, love, beauty, etc.	• Beliefs regarding fundamental definition and drivers of problem • The appropriate scope of participation of the public, experts and elites in policy decisions • Overall seriousness and cause of the problem • Power distribution of authority between government and market • Priority accorded various policy instruments (e.g. regulation, taxation, education, etc.) • Ability for society to solve the problem (e.g. technological optimism vs. pessimism) • Policy core preferences that project a vision for the subsystem	• Perceptions of the severity of different aspects of the problem in specific locations • Beliefs about the performance of specific programs or institutions • Beliefs regarding causal drivers in different locales over time • Most decisions concerning administrative rules, budgetary allocations, disposition of cases, statutory interpretation, and statutory revision

The ACF describes congruence of policy core beliefs, rather than deep core or secondary beliefs, as the primary driver in the formation of advocacy coalitions coalitions (Matti &

Sandström, 2011). Policy core beliefs can be further segmented into normative policy core beliefs (tied to an individual's value-orientations) and empirical policy core beliefs (technical understanding of the problems and solutions). Empirical policy core beliefs and secondary beliefs are more susceptible to change due to their emphasis on the practical nature of policy issues (Matti & Sandström, 2011; Henry & Dietz, 2012).

2.3 Learning as an Agent of Policy Change

> "Politics finds its sources not only in power but also in uncertainty – men collectively wondering what to do… Policy-making is a form of collective puzzlement on society's behalf."(Heclo, 1974, quoted in Bennett & Howlett, 1992)

Policy-oriented learning can be described as an ongoing process of searching for evidence and adapting beliefs to new information, primarily driven by a mission to achieve one's policy objectives (Jenkins-Smith et al., 2014). Policy-oriented learning generally involves refining one's understanding of the status of an individual's policy goals, improving one's understanding of instrumental relationships between factors in one's belief system, and acknowledging and addressing challenges to one's belief system (Bennett & Howlett, 1992). Learning most often starts at the individual level and then disseminates to the collective level (Heikkila & Gerlak, 2013). As belief adaptation occurs incrementally over a period of a decade or more, policy-oriented learning gradually alters the assumptions and preferences of stakeholders within a policy subsystem (Jenkins-Smith et al., 2014).

Learning may give one a competitive political advantage in dynamic policy arenas where technical developments require an up-to-date understanding of policy problems (Jenkins-Smith

& Sabatier, 1993). Moreover, learning shapes an actor's preferences for policy solutions that may ultimately be translated into policy change (Heikkila & Gerlak, 2013).

2.4 The Role of Scientific and Technical Information in Policy Learning

Sources of scientific or technical information that inform the policy-learning process include policy analyses, government reports, literature in the natural and social sciences, and research generated by universities, think tanks, and private consultants (Weible, 2008). The use of scientific and technical, expert-generated information in policymaking may be political, used as an advocacy weapon rather than a source of learning, or instrumental, impacting the design of policy itself (Weible, 2008). "Experts" include researchers, analysts, and scientists in the government and nongovernmental organizations.

ACF scholars recognize that scientists and experts, like other actors, are motivated by personal beliefs like other actors and may belong to advocacy coalitions (Sabatier & Zafonte, 2001). Researchers and scientists within coalitions may provide evidence that reinforces beliefs of their fellow advocacy coalition members (Montpetit, 2011). Indeed, the perceived legitimacy of technical information, and the researchers who produce it, hinges on congruence with one's existing policy core beliefs (Montpetit, 2011). A phenomenon known as biased assimilation describes the tendency of individuals to interpret evidence in ways that support their existing beliefs (Henry & Dietz, 2012). Therefore, individuals from divergent coalitions often interpret the same information differently, which can reinforce feelings of distrust (Henry & Dietz, 2012). Weible (2008) posits that the influence of scientific and technical information on learning depends upon the level of conflict between coalitions, suggesting that utilization of scientific

knowledge is least likely in an adversarial subsystem experiencing conflict between warring coalitions.

2.5 Conflict and Belief Change

During periods of intense conflict, when core beliefs are threatened and stakes are high, actors are less receptive to information and analysis that threatens their existing belief system (Jenkins-Smith & Sabatier, 1993). During low levels of conflict, actors are not actively engaged in debate, and therefore unlikely to revise beliefs or adopt beliefs from opposing coalitions (Jenkins-Smith et al., 2014). Intermediate levels of conflict occur when coalitions are threatened enough to attend to policy issues yet their core policy beliefs are adequately secure so that they are receptive to new information, and therefore may consider revising their beliefs or even adopting beliefs held by other coalitions (Jenkins-Smith et al., 2014).

2.6 National Forest Policy Studies and the ACF

The ACF has been widely applied to understand policy change and stability in the areas of natural resource management (Sotirov & Memmler, 2012). Forest policy scholars around the world have found particular value for the framework in analyzing long-standing conflicts around the conservation and sustainable management of forest resources (Sotirov & Memmler, 2012). Three ACF studies look at national forest policy change within the United States.

Sabatier, Loomis, & McCarthy (1995) were the first scholars to apply the ACF to the study of US national forest policy. Sabatier et al.'s analysis (1995) of Forest Service planning decisions under the 1976 National Forest Management Act (NFMA) during the late 1980s and early 90s found the ACF useful in explaining the influence of competing constituency groups upon forest plan outcomes. This analysis challenged the traditional Progressive Reform Model of the Forest Service as a neutral and efficient public bureaucracy making decisions based solely

upon technical expertise and suggested that the agency staff includes individuals who share core policy beliefs with external interest groups.

Burnett and Davis (2002) found support for ACF hypotheses to explain national forest timber harvesting policy changes within the Pacific Northwest from the 1960s until adoption of the NWFP in 1994. Burnett and Davis suggested that the membership of advocacy coalitions had remained stable, however core policy beliefs had changed over time, particularly within the amenity coalition. Salka's ACF analysis (2004) of congressional testimony by USFS leadership before and after the "spotted owl crisis" of the 1980s and 90s argued that agency personnel, previously aligned with a distinct scientific management coalition, largely evolved into policy brokers, seeking balance between competing coalitions since adoption of the NWFP.

2.6.1 Advocacy Coalitions in National Forest Policy Systems

ACF studies concerning natural resource policy subsystems most often identify two competing stakeholder coalitions, commonly a variation of a pro-environmental protection versus a pro-economic development coalition (Sotirov & Memmler, 2012). Less commonly, ACF studies of cases within forest, water, and agricultural policy identify three competing coalitions. In these studies, the third coalition often represents a traditional scientific management paradigm and is composed of government administrators, politicians, and scientists (Sotirov & Memmler, 2012). ACF scholars have identified three coalitions within national forest policy systems: a commodity coalition representing timber interests, an amenity coalition consisting of environmental and outdoor recreation interests, and a scientific management coalition composed primarily of Forest Service employees (Burnett & Davis, 2002; Sabatier et al., 1995; Salka, 2004).

In general terms, the policy goals of the commodity coalition consist of maximizing the production of timber and other resources on national forest lands while the amenity coalition is ultimately concerned with preservation of forest lands and the provision of recreational opportunities (Salka, 2004). The scientific management coalition is concerned with maximizing agency discretion, minimizing political influence, and managing forests according to scientific expertise (Salka, 2004). Studies have shown that the influence of each coalition has changed over time, with the commodity and scientific management coalitions garnering the most authority within national forest policy decisions until the 1970s, when major federal environmental laws created more favorable conditions for the amenity coalition to influence national forest policy outcomes (Burnett & Davis, 2002; Sabatier et al., 1995; Salka, 2004).

2.7 Opportunities to Contribute to Literature

This study attempts to make three primary contributions to the ACF literature: 1) application of elite interviewing methodology to better understand the process of policy-oriented learning, 2) examination of the influence of science on individual belief change, and 3) an update to ACF literature pertaining to policy change within the Pacific Northwest national forest policy subsystem. The following sections elaborate on these potential contributions.

2.7.1 Innovations in Understanding Policy-Oriented Learning

> "If there were an area within ACF deserving of innovations in theory and methods, it would be policy-oriented learning." (Weible et al., 2011)

Weible et al. (2011), in their review of the first quarter-century of ACF literature, point to thoretical and methodological issues related to the study of policy-oriented learning, suggesting the need for new approaches to understand individual belief change as well as instances of non-learning and the affirmation of previously-held beliefs.

ACF studies generally rely on a suite of approaches to data collection such as content analysis, surveys, interviews, observations, or a combination of these methods (Weible et al., 2011). However, nearly half of ACF applications use unspecified or unsystematic methods of data collection, preventing meaningful comparison of results (Sotirov & Memmler, 2012; Weible et al., 2011). Scholars researching policy-oriented learning have primarily employed interviewing methods to triangulate data gathered from document analysis or to inform the development of survey questions (Weible et al., 2011; Weible, Sabatier, & McQueen, 2009).

A major limitation for surveys and document analysis, commonly employed methods to understand policy-oriented learning, is that while both methods can provide *evidence* of belief change, neither will get to the "why" of belief change, which is central to this inquiry. Fixed-answer surveys constrain responses to pre-determined categories (Tansey, 2007), potentially limiting data collection to the bounds of the researchers' own expectations. Congressional hearings and testimonies, a common source for ACF document analysis, run the risk of representing only organizationally-sanctioned beliefs, rather than individuals' true beliefs (Jenkins-Smith & Sabatier, 1993). Meanwhile, archival documents can be intentionally or unintentionally destroyed or lost and documents that are available may be incomplete, providing a distorted account of the content (Tansey, 2007).

In order to provide a rich qualitative inquiry into the phenomenon of policy-learning, this study employs qualitative, in-depth interviewing techniques to collect retrospective and current data about polciy beliefs. In-depth interviews allow an individual to provide their own narrative of how and why their beliefs have changed, unfettered from the potential limitations of predetermined survey answers (Kuckartz, 2014). As a result, the researcher may be more likely

to discern variation among individual beliefs and opinions and detect unanticipated themes (Rubin & Rubin 2005).

Interviews do pose challenges for ACF research. The reluctance to rely on qualitative interviews for longitudinal data regarding policy belief change may be due in part to the perception that memory recall is not a reliable source of empirical data about the past (Henry, 2015). Interviewees can also misrepresent their own positions, so as to inflate or minimize their role in a particular process or event (Tansey, 2007). With these limitations in mind, this study attempts to utilize interviewing techniques to solicit retrospective and current beliefs from participants.

2.7.2 Understanding the Role of Science in Belief Change

Although the ACF was originally conceived as a means for understanding the role of scientists and influence of scientific information in the policy process (Jenkins-Smith et al., 2014), this aspect of the theory has not been a focus for the majority of ACF scholars (Weible et al., 2011). The research that has been done in this area thus far suggests that the role of science in the policy process is largely dependent upon the level of conflict within the policy subsystem (Jenkins-Smith et al., 2014). Jenkins-Smith et al. (2014) suggest that the next step for ACF policy scholars regarding the role of science is to test expectations around the use of scientific information under different policy subsystems with varied levels of conflict. Given that the introduction of the NWFP attempted both to mediate intense policy conflicts and introduce a scientific paradigm for forest management (Yaffee, 1994), this case study provides a prime opportunity to conduct such research.

2.7.3 Revisiting National Forest Policy in the Pacific Northwest

Previous ACF scholarship specific to the Pacific Northwest national forest policy subsystem concluded with the adoption of the 1994 Northwest Forest Plan (Burnett & Davis, 2002; Salka, 2004). The present study will provide an update to the scholarly narrative of change within the subsystem, thereby contributing to the overall ACF literature regarding the evolution of national forest policy within the Pacific Northwest.

3. Case Study Description

This chapter provides the rational for selection of the case study topic: policy belief changes among Pacific Northwest national forest stakeholders since adoption of the NWFP. The chapter begins with an argument for why this case is particularly well-suited for analysis within the ACF. The following sections describe the context for the case and the history of policy conflicts that lead to the adoption of the NWFP.

3.1 Rationale for the Case Study

Adoption of the NWFP over two decades ago heralded a major policy change within the Pacific Northwest national forest policy subsystem. Two features of the Northwest Forest Plan provide rich opportunities for the application of ACF within this case: 1) the Plan attempted to mediate conflicting values and beliefs about national forest management, and 2) a wealth of scientific and technical information is available regarding performance of the Plan and overall environmental and social conditions within the subsystem. For instance, over twenty years of implementation monitoring (REIC, 2015) has generated a substantial amount of technical information. Furthermore, Pacific Northwest National forests have been subject of extensive

analysis due to the high-profile nature of the NWFP policy change (Arabas & Bowersox, 2004; T. A. Spies & Duncan, 2009). Previous ACF studies have found that policy-oriented learning is more likely to occur when the level of conflict within the policy subsystem is intermediate and when scientific and technical information about the policy issues is widely available (Jenkins-Smith et al., 2014). The following sections describe the features of the NWFP that may have provided these two conditions within the policy subsystem.

3.1.1 NWFP and Conflict Management

The decade preceding implementation of the NWFP was marked by conflict that played out in legislative and judicial arenas. The adoption of the NWFP may have produced an intermediate level of conflict by moderating an era of intense uncertainty for each coalition's core values. For instance, court injunctions in 1989 halted over 130 pending timber sales and placed an indefinite ban on future logging across 24 million acres of national forests in the Pacific Northwest (Yaffee, 1994). The sudden halt and uncertain future of logging on national forests directly threatened the commodity coalition's core beliefs about forest management. Rapid depletion of old growth forest and decline of old-growth dependent species leading up to the injunctions was an affront to the amenity coalition's preservation-orientation. Meanwhile, involvement by the judicial branch may have violated preferences for agency decision-making authority held by many scientific management coalition members.

President Clinton, of the process to develop the NWFP, stated, "Its outcome cannot possibly make everyone happy. Perhaps it won't make anyone completely happy. But the worst thing we can do is nothing" (FEMAT, 1993). Although the NWFP was unlikely fully satisfactory to any one party, the NWFP implemented policies that promised a certain level of security for

each coalition's core beliefs. Adoption of the plan ended timber harvest injunctions and set targets for harvest that may have alleviated some uncertainty about timber sales for the commodity coalition. The NWFP delineated reserves and ecological forestry standards that committed the Forest Service to specific conservation measures, thereby meeting concerns of the amenity coalition. Lastly, adoption of the NWFP put into place an administrative, science-based solution intended to bring management decisions back into the domain of agency experts, thereby attempting to appease members of the scientific management coalition. Relative to the intense conflict preceding adoption of the plan, the author argues that the NWFP heralded an era of intermediate conflict within the national forest subsystem in the Pacific Northwest.

3.1.2 NWFP and the Generation of Scientific Information

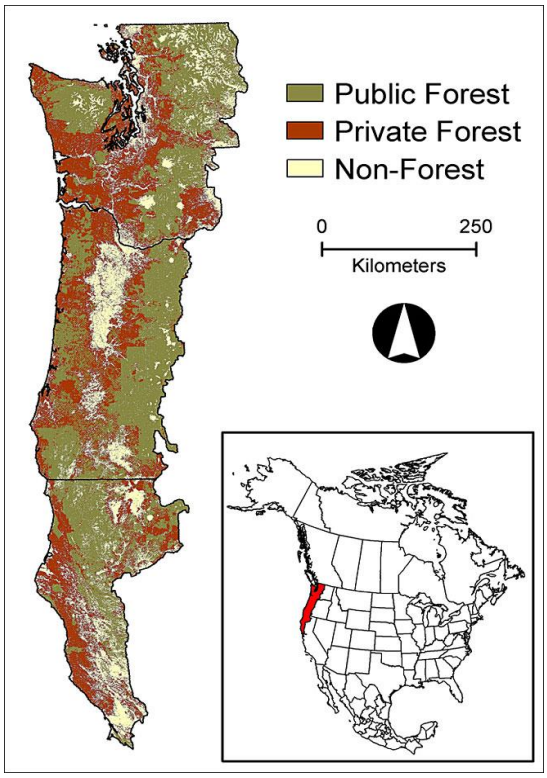
A unique feature of the NWFP is an extensive implementation monitoring program that provides detailed technical analysis about the policy's impact on watershed health, northern spotted owl and marbled murrelet habitat, and the maintenance and restoration of late-successional and old growth forests (REIC, 2015). The accumulation of scientific evidence tied directly to tenets of the existing NWFP policies may serve an enlightenment function within the policy subsystem. The enlightenment model describes the role of research in illuminating, advancing and legitimating changes in opinion regarding policy (Weiss, 1977). The variety of publicly available government reports about the performance of NWFP, as well as policy analyses by non-profits, industry groups, and think tanks, suggests that all actors should have adequate technical information sources to engage in informed dialogue.

3.2 Background: National Forest Conflicts in the Pacific Northwest

The following sections elaborate upon the geographical and political landscape of the Pacific Northwest national forest policy subsystem. The sections outline the history of conflicts leading up to the NWFP and highlight key features of the NWFP itself.

3.2.1 Pacific Northwest National Forests

Figure 1 - Northwest Forest Plan Area



Source: Oregon State University

For the purposes of this research, the term "Pacific Northwest national forests" includes 19 national forests in Washington, Oregon, and Northern California whose Forest Land Management Plans were amended by the 1994 Northwest Forest Plan. The Northwest Forest Plan area (Figure 1) encompasses over 24 million acres of federal lands within the range of the northern spotted owl (*Strix occidentalis caurina).* Of these federal lands, 19.5 million acres are administered by the U.S. Forest Service (USFS or Forest Service), 2.7 million are administered by the Bureau of Land Management, and 2 million acres are administered by the U.S. National Park Service. With exception of lowland valleys and coastal plains, much of the forested area is dominated by mountainous terrain and coniferous forests (Arabas & Bowersox, 2004; FEMAT, 1993). In

general, these forests are well adapted to regional climactic conditions of mild winters with high precipitation and hot, arid summers (FEMAT, 1993). However, the Northwest Forest Plan area contains a great deal of diversity in geography and precipitation levels and is divided into twelve distinct physiographic provinces accordingly (FEMAT, 1993).

3.2.2 Pacific Northwest National Forest Policy Subsystem

Jenkins-Smith et al. (2014) assert that a subsystem is composed of actors directly or indirectly influencing policy matters within a particular policy topic area. For the purposes of this study, the Pacific Northwest national forest policy subsystem encompasses the range of individuals directly or indirectly engaged in influencing national forest policy within Washington, Oregon and Northern California including representatives of federal, state and local governments, Native American tribes, private industry, unions, trade associations, nonprofit organizations, academic institutions, and politically active citizens. Direct involvement may include advocacy, lobbying, use of media to convey opinion, testimony at official meetings or hearings, and/or participating in planning and policy-making venues. Indirect involvement may include employment at an organization or agency within the policy subsystem whose work ultimately affects the development or implementation of policy solutions.

3.2.3 Old Growth and Owls: A Brief History of the "Timber Wars"

Although the exact attributes of old-growth forests vary by forest type and geographical setting, old growth includes "forests of advanced age (at least 150-200 years old) that are characterized by structural complexity and a mix of species" (Johnson & Swanson, 2009). Historically, the Forest Service had classified old-growth forests as over mature, having passed the point where they were adding new wood fiber to their biomass (Yaffee, 1994). The dead and

decaying material prevalent in old-growth forests was perceived as vectors for insect infestation and forest fires (Yaffee, 1994). Further, old-growth forests were assumed to be devoid of biological values due to lack of apparent value for game species (Spies, 2009).

From the time of European settlement in the early 1800s to 1980s, old-growth forests across Pacific Northwest had likely declined by 65-90% due to a combination of natural disturbances and harvests targeting valuable old-growth timber (Spies & Duncan, 2009). Of the remaining old-growth forests, 90% was estimated to be on federal land (Layzer, 2002). The emergence of environmental law and persistence of federal timber programs in the Pacific Northwest set the stage for conflicts around management of valuable and rapidly disappearing old-growth forests.

Beliefs about the ecological values of old-growth forests began to change with the emergence of research related to the structure, composition, and function of old-growth forests in the late 1970s and early 80s (Spies, 2009). Research indicated that while few species were limited to old-growth forests, some may depend upon the habitat (Spies, 2009). Among the species thought to be dependent upon the diminishing old-growth forests of the Pacific Northwest was the northern spotted owl (SEIS Team, 1994). When the Endangered Species Act (ESA) was adopted, the U.S. Fish and Wildlife Service (USFWS) included the owl on a list of potentially endangered species (Layzer, 2002). Environmental interests honed in on threats to the previously cryptic species, arguing that if the owl's primary habitat was old-growth forests, which had been largely eradicated from private lands and were being liquidated on federal lands, the species was eligible for listing under the ESA as threatened (Thomas, 2009).

Interagency coordination to address the northern spotted owl began in 1977 with the development of guidelines for public land management in Oregon by the Oregon State Game

Commission's Endangered Species Task Force (Thomas et al., 1990). In an apparent attempt to avert ESA listing of the species, the Forest Service and Bureau of Land Management adopted the Task Force's recommendations and set aside 300 acres of old growth for each of 400 pairs of owls estimated to reside on federal lands in the region (Layzer, 2002). Environmentalists, dissatisfied with the levels of protections, filed administrative appeals in 1980 that the Forest Service failed to comply with the National Environmental Policy Act (NEPA) by preparing an environmental impact statement (Yaffee, 1994).

Between 1981and 1984 the Forest Service produced a Region 6 Guide for old growth forests, designating the spotted owl as the indicator species for the old-growth ecosystem (Layzer, 2002). Environmental groups filed yet another administrative appeal in 1984, challenging methodology and management practices in the guide. In response, the region prepared a supplemental environmental impact statement (SEIS) on spotted owl management (Layzer, 2002). Meanwhile, federal timber harvest between 1982 and 1988 had increased from less than three to more than five billion board feet (Adams, 2006). When Forest Service released its final SEIS for the spotted owl plan in 1988, conservation and timber industry organizations sued, claiming the plan violated federal laws (Adams, 2006). U.S. District Court Judge William L. Dwyer issued a temporary injunction in May 1989, halting 135 timber sales in spotted owl habitat (Adams, 2006).

The same year, an Interagency Scientific Committee (ISC), chaired by Forest Service biologist Jack Ward Thomas, was chartered to create a scientifically-legitimate plan for northern spotted owl management (Yaffee, 1994). The Interagency Conservation Strategy for the Northern Spotted Owl, released in 1990, outlined an ambitious strategy to protect 8.4 million acres of forestland in the Pacific Northwest (Yaffee, 1994). Shortly after the release of the plan,

the owl was listed as threatened under the ESA (Thomas et al., 2006). The ISC report concluded that it would not be possible to protect old-growth ecosystems and continue historic timber harvest levels (Thomas et al., 2006).

The projected economic impacts of the ISC recommendations raised concerns from timber industry representatives who estimated it would cost $95 million to protect each owl pair and result in an immediate loss of 9,000-12,000 industry jobs throughout the Pacific Northwest (Yafee, 1994). Controversies related to the economics of old-growth forest management revolved around three primary issues: the role and amount of federal old-growth timber in the market, the obligations that land managers had to communities adjacent to federal forests, and the role of federal forests in regional economies (Haynes, 2009). Amid the debates, the Forest Service attempted to continue timber sales, which were promptly appealed by environmental organizations (Adams, 2006).

Meanwhile, timber production dominated federal forest management in the Pacific Northwest. The Forest Service estimated that in 1988 44% of Oregon's economy and 28% of Washington's economy was directly or indirectly dependent upon federal timber (Layzer, 2002). Logging on federal lands also provided revenue for local governments, as 25% of federal timber receipts were returned to the counties where the sales occurred (Layzer, 2002). The timber industry of the 1980s was divided between a rapidly-growing segment of technologically-efficient mills cutting mostly second-growth timber from private timber lands and a sector of mills that processed logs from older trees, mostly from federal forests (Haynes, 2009). Old-growth logging was labor intensive, supporting highly-skilled cutters and small, independent mills, and producing valuable lumber (Adams, 2006).).

In the years leading up to the 1994 Northwest Forest Plan, one dozen lawsuits involving old growth forests or dependent species such as the northern spotted owl or marbled murrelet were filed against federal land managers in the Pacific Northwest (SEIS Team, 1994). Multiple court injunctions halted logging operations and timber sales on federal lands for over three years (Adams, 2006). Meanwhile, amenity coalition and commodity coalition members alike advanced legislative proposals in Congress for securing old-growth habitat and stable timber supplies, respectively.

3.2.4 Development of the Northwest Forest Plan

In April 1993 President Bill Clinton, who campaigned upon a promise to resolve the region's controversy, convened a roundtable summit of key stakeholders in the Pacific Northwest national forest management policy debates (Yaffee, 1994). At the conclusion of the meeting, President Clinton directed his cabinet secretaries to craft a "balanced and comprehensive long-term" plan to end forest management conflicts in the Northwest (Yaffee, 1994). The administration convened the Forest Ecosystem Management Assessment Team (FEMAT), granting the interdisciplinary team of seventy scientists ninety days to produce a series of scientifically-based options for managing the region's forests (Spies & Duncan, 2009). FEMAT built upon the work of previous studies, such as the ISC report, to draft its recommendations (Thomas et al., 2006). Never before had scientists been given such latitude to develop a management plan, nor had a plan been developed on as grand a scale, affecting twenty-eight administrative units across over 20 million acres of federal forests lands in three states (Shannon, 2004). Throughout the FEMAT process selected scientists worked in isolation, presumably untethered from political influence, to craft unbiased recommendations (Shannon,

2004). The process has been criticized for occurring behind closed doors, excluding contrary scientific perspectives, and overemphasizing environmental protection (Swanson, 2004).

The presidential mandate directed FEMAT to identify and analyze a range of options for an "ecosystem approach to forest management" addressing the "maintenance and restoration of biological diversity, particularly that of the late-successional and old-growth ecosystems, maintenance of long-term productivity of forest ecosystems; maintenance of sustainable levels of renewable natural resources, including timber, other forest products, and other facets of forest values; and maintenance of rural economics and communities" (FEMAT, 1993). In essence, FEMAT's stated goals were to establish integrated solutions to resolve ecological as well as economic concerns related to Pacific Northwest national forest management. Despite the broad mandate, the primary driver of the effort was a need for federal land managers to meet the requirements of the ESA as well as the viability clause of Forest Service regulations pursuant to National Forest Management Act (NFMA) (Thomas et al., 2006). Regulations implementing the NFMA required the Forest Service to maintain "viable populations" of vertebrate species, defined as having sufficient reproductive individuals to ensure the continued existence of the species within the planning area (Johnson & Swanson, 2009). The regulations regarding viable populations paired with ESA listings resulted in clear policy obligations for maintaining non-game species dependent upon a range of habitats within national forest lands (Johnson & Swanson, 2009). FEMAT considered the habitat requirements of more than 1,000 species of plants and animals in the analysis (Thomas et al., 2006).

The FEMAT report (1993) produced ten distinct options for forest management including the following elements:

- Designation of Late-Successional Reserves (LSRs) encompassing older forest stands.
- An Aquatic Conservation Strategy including the designation of riparian reserves consisting of buffers along rivers, streams, lakes, and wetlands and requirement for watershed analysis before management can proceed.
- Designation of "matrix" lands outside of reserves to be managed for timber harvest.
- Varied prescriptions for silvicultural manipulations (thinning and salvage) within LSRs.
- Adaptive Management Areas (AMAs), unique to option nine, to be set aside for the development and testing of ecosystem management approaches.

The options varied in terms of the quantity and location of areas placed in reserves; the management activities permitted in those areas; the boundaries of areas outside reserves; and the management activities permitted in areas outside of reserves (FEMAT, 1993). Of the ten options, Option 9 attempted to integrate terrestrial and aquatic protection measures and included an adaptive management element to test assumptions inherent in the management strategies (Thomas et al., 2006). The Clinton Administration selected Option 9 to provide the framework of what would be known as the Northwest Forest Plan (NWFP).

3.2.5 The 1994 Northwest Forest Plan

Concerned that the courts would reject a plan that did not protect all species to the highest level possible, the Clinton Administration altered FEMAT's Option 9 to enlarge riparian buffers on intermittent streams, create reserve buffers around known owl nest sites in matrix lands, and establish a "survey and manage" list of species (Thomas et al., 2006). These changes effectively reduced the amount of land available for harvest in the matrix. Survey and manage was the most dramatic alteration, requiring the agency to survey for the presence of over 400 species of flora

and fauna in old-growth and late-successional forests before harvest could occur in matrix lands (Thomas et al., 2006).

As adopted, the NWFP projected to provide "probable" sale of 805 million board feet of timber annually, an 82% decrease from the average of 4.5 billion board feet of annual allowable sales of federal timber during the 1980s (Grinspoon & Phillips, 2015). Scheduled timber production was limited to matrix and adaptive management areas, accounting for approximately 22% of the federal forest lands within the region (Table 2). Late-successional reserves (accounting for 30% of the NWFP area) contained varied levels of late-successional and old-growth forests as well as younger stands, with the intent to preserve existing old stands and to actively manage for the development of late-successional forest characteristics within younger stands (Thomas et al., 2006). Over 1.5 million acres of adaptive management areas were established to support experimentation and evaluation of alternative management strategies and theoretically help improve the implementation of the plan as a whole (SEIS, 1994). An Interagency Regional Monitoring Program was established to evaluate the effectiveness of the NWFP in meeting its management objectives and monitor socioeconomic and ecological indicators associated with plan objectives (REO, 2016).

Although the Final Environmental Impact Statement (FEIS) for the 1994 Northwest Forest Plan was appealed by industry and environmental interests alike, the plan was ultimately approved by Judge Dwyer (Thomas et al., 2006). Logging injunctions were lifted and the plan was adopted as an administrative amendment each of the national forest land management plans within the NWFP region.

Table 2 - Land-use Allocations in the Northwest Forest Plan (Thomas et al., 2006)

Land-use allocations	**Acres (%)**
Congressionally reserved areas[1]	7,323,624 (30%)
Late-successional reserves	7,433,808 (30%)
Managed late-successional reserves[2]	102,240 (1%)
Adaptive management areas	1,522,415 (6%)
Administratively withdrawn areas[3]	1,477,698 (6%)
Riparian reserves	2,628,563 (11%)
Matrix	3,976,909 (16%)
Total	24,465,257 (100%)

[1]Wilderness areas, national parks, and other areas designated by Congress before the Northwest Forest Plan

[2]Buffers for owls and other species

[3]Areas identified as withdrawn from timber production in forest or district plans before the Northwest Forest Plan

4. Methods

This chapter explains the rationale for the research design and presents the methods employed to address the research questions presented in Chapter 1.

4.1 Research design

A major assertion of the ACF is that researchers must assume a long-term perspective of a decade or more to understand policy processes and change (Jenkins-Smith et al. 2014). Although conflicts around PNW forest management span decades (Arabas & Bowersox, 2004; Layzer, 2002; Yaffee, 1994), this study concerns changes in policy beliefs from the time of the height of old-growth forest management conflicts in the late 1980s to early 1990s until present-day. This timescale was chosen to capture individuals who were involved in policy debates that

ultimately informed the NWFP and who have been engaged in the policy subsystem throughout the duration of the plan's implementation.

Studies of individual beliefs often rely on cross-sectional surveys of attitudes among elites, which can convey complexities of belief systems but are situated in specific places in time (Jenkins-Smith and Sabatier, 1993). Although surveys provide a strong instrument for assessing beliefs, longitudinal surveys are rare due to the logistical challenges of replicating surveys over long time spans (Jenkins-Smith and Sabatier, 1993). Kuckartz (2014) suggests that semi-structured interviews may be better suited for theory-testing research than standardized surveys because respondents can answer in their own words rather than being limited to predetermined answers. In-depth, semi-structured interviews are also considered an effective method for detecting nuance and subtlety in beliefs and opinions and understanding an individual's change over time (Rubin & Rubin, 2005). Therefore, this study employs a qualitative inquiry approach by way of semi-structured interviews with policy elites with a rich history of involvement with policy decisions and advocacy within the subsystem.

A research proposal and interview guide (Appendix A) were submitted to the University of Washington's Human Subjects Institutional Review Board, which granted the research exempt status (HSD Study #50196).

4.2 Sampling Method

The research employed purposive sampling to reach members of a particular subgroup with distinct characteristics (Patton, 2002). In this case, the criteria for selecting the sample of interviewees was that each individual had a documented history of at least 25 years of involvement with national forest policy in the Pacific Northwest. Involvement with national forest policy is defined for the purposes of this work as a professional or volunteer affiliation

with an agency, organization, or business directly affected by national forest policy or engaged with either implementing or influencing national forest policy. Participants were selected who were affiliated with conservation organizations, the timber or forest products industry, government agencies, and academic researchers. A list of preliminary interview candidates was developed from the following sources: congressional hearings related to Pacific Northwest national forest management from 1989-1994, the roster of the 1993 Forest Ecosystem Management Team, and the roundtable participants at President Clinton's Forest Conference in April 1993. Interview candidates were limited to those whose current contact information was available through primary or secondary sources. In addition to the original target list, snowball sampling was used to identify additional participants by asking each interviewee to recommend additional candidates that meet the study criteria. Sampling ceased when referrals began to become redundant, recommending the same individuals as additional participants.

Ultimately, the sample (n=20) was composed of affiliates of state and federal agencies (40%), conservation organizations (30%), the timber industry (25%), and academic institutions (5%). Seven participants were members of the Forest Ecosystem Management Assessment Team (FEMAT) who developed the recommendations that would become the Northwest Forest Plan (NWFP). Agency representatives included individuals from the Washington State Department of Natural Resources (DNR) (1), the USFS (4), the National Oceanic and Atmospheric Administration (NOAA) (1), and the Environmental Protection Agency (EPA) (1). Several USFS staff worked on national forests (3) while others served as agency research scientists (2) within the NWFP region. Timber affiliates included individuals who worked on behalf of corporate timber companies or industry interest groups (3) as well as those associated with independently-owned mills and logging operations that historically depended upon federal

timber (2). Conservation affiliates included individuals who worked or volunteered for national advocacy organizations (3) and local, state-based organizations (3). The sample was not stratified, resulting in a potential bias toward professional affiliations that have greater representation within the study.

4.3 Interviews

Interviews took place over the course of three months in 2015. Individuals were contacted by email and/or telephone and asked to participate in the study. Of the individuals contacted, 41% replied and ultimately 20 individuals were interviewed. The majority of interviews were conducted over the phone (n=16), while the remainder were interviewed in-person (n=4). The average interview length was 53 minutes. Participants were informed of their rights as human subjects, assured confidentiality, and were asked for permission to record interviews. Interviews were recorded on a Sony ICD PX333 Digital Voice Recorder.

All interviews followed a semi-structured approach with a set of open-ended questions and a series of probes and follow-up questions to solicit detailed explanations and clarification, as needed (Rubin & Rubin, 2005). The interview guide (Appendix A) encouraged subjects to reflect upon their beliefs about commonly disputed aspects of Pacific Northwest national forest management during the period of conflict leading up to the Northwest Forest Plan (late 1980s and early 1990s) as well as their present-day beliefs. All study participants were assigned codes (S1-S20) to ensure traceability of quotes while protecting the anonymity of participants.

4.4 Data Analysis

This section describes the analytical process used to identify and describe belief change within the transcripts as well as the influences upon learning. The final themes that emerged

from the data are also presented. This section also describes the method by which participants were assigned to advocacy coalitions for purposes of analysis.

4.4.1 Coding and Theme Construction

Recordings of interviews were transcribed verbatim, printed, and hand-marked with preliminary notes and observations. Digital transcripts were imported into the computer-assisted qualitative data analysis software program Dedoose for coding. Codes are labels that assign meaning to descriptive or inferential data collected during a study (Miles, Huberman, & Saldana, 2014). Codes are used to retrieve and organize similar data and aid the researcher in relating data to research questions, theoretical concepts, and themes (Araujo, 1995; Miles et al., 2014).

Saldana (2013) describes two major stages of coding: first cycle and second cycle. First cycle coding applies initial codes to data while second cycle coding primarily involves categorizing the first level codes rather than the original data (Miles et al., 2014). The process began with an *a priori* coding system informed by the ACF theory as well as the researcher's expectations, informed by initial literature review about the policy subsystem regarding the types of beliefs that might be expressed. Upon initial readings of transcripts, the majority of pre-determined codes did not fit the data and the *a priori* coding system was abandoned in favor of an inductive approach. Inductive analysis is the systematic process whereby the researcher derives concepts and themes from the raw data by way of interpretation (Thomas, 2006). Second cycle coding took a primarily deductive approach. Deductive analysis refers to the process of testing whether data are consistent with "prior assumptions, theories, or hypotheses" (Thomas, 2006).

In order to answer the first research question about whether individuals have changed their policy core or secondary policy beliefs, transcripts were first reviewed line by line for expressions of values and beliefs. First cycle coding involved assigning descriptive value codes to expressions of beliefs regarding aspects of national forest management. A value is the importance one attributes to a person, thing or idea; an attitude is the way an individual evaluates or reacts to a person, thing, or idea; and a belief is part of a system that includes values and attitudes in addition to personal knowledge, experiences, opinions, and other interpretive impressions of the world (Saldana, 2013). Value coding is the "application of codes to data that reflect an individuals values, attitudes, and beliefs, representing his or her perspectives or worldview" (Saldana, 2013). Value codes were applied to past and present beliefs about the agencies, actors, policies, and programs within the policy subsystem. A meta-analysis of first cycle codes was conducted by creating a thematic profile matrix (Kuckartz, 2014) to allow for comparison of participants' statements regarding specific topics and to create overarching thematic codes for topics. This exercise informed second cycle coding whereby the researcher grouped codes into a smaller number of categories and themes (Miles et al., 2014).

During second-cycle coding, the data was further refined by grouping types of beliefs according to their compatibility with definitions of policy core and secondary beliefs as defined in Table 1. Codes consistent with ACF constructs were organized under themes and subthemes via hypothesis coding. Saldana (2013) describes hypothesis coding as the application of predetermined concepts developed from a theory independent of the data.

Codes were again retrieved to compare and contrast data classified under the same codes. The data was assessed out of context of the transcripts for consistency among the codes and also re-examined in the context of each transcript to check for accuracy in the interpretation. Codes

were reassigned or dropped from categories as needed until the coding frame became fully consistent internally and externally in relation to the ACF theory. This approach, known as the decontextualization/recontextualization approach (Araujo, 1995), allows for refinement of the coding frame by testing for coherency and consistency. After multiple rounds of decontextualization and recontextualization, the final thematic constructs (Table 3) and coding frame (Appendix B) was adopted.

Throughout the process, data were examined for clear evidence of belief change. Belief change was most commonly identified during responses to the following interview questions:

> "What have you learned over the past twenty years that's influenced how you think about national forest management?"
>
> "Have your views on the issues related to Pacific Northwest national forests changed since the early 1990s? (If yes) How? Can you describe a couple of examples of how your views changed?"

Occasionally, evidence of belief change would emerge earlier in the interview, while participants were discussing policy problems. Indicators of revised beliefs included variations of phrases such as, *"I used to think…"* and *"now I see that…"*; *"I've learned…"*; *"I didn't think that earlier…"*; or *"My perspective on X has changed*." In order to be coded for belief change, individuals had to clearly indicate a revision in thinking. This approach poses limitations, as individuals may not always be conscious of how their beliefs have changed over time. The analysis identified four primary themes for policy-oriented learning among participants and eleven corresponding sub-themes (Table 3).

Table 3 - Summary of National Forest Policy Learning Themes

Policy Belief Definitions *(Matti & Sandström, 2011; Sabatier & Jenkins-Smith, 1999)*		**National Forest Policy Learning Themes**	**National Forest Policy Learning Sub-Themes** *Belief change topics from interviews*
Policy Core	*Ability for society to solve the problem*	**Policy solutions to systemic problems**	Ability to advance ecological values through active management Viability of scientific solutions to policy problems
	Priority accorded policy instruments		Utility of wilderness and park designations
Secondary	*Perceptions of the severity of different aspects of a problem in specific locations*	**The severity of distinct forest management problems**	Catastrophic wildfire in fire-prone forests Early successional habitat on federal lands Over-stocked plantations
	Beliefs regarding causal drivers for problems in different locations over time		Threats to old growth in fire prone forests Decline of northern spotted owl
	Beliefs concerning administrative rules, budgetary allocations, policy implementation, and interpretation	**Policy solutions to distinct problems**	Flexibility of NWFP standards and processes Commercial thinning for restoration of plantations
	Beliefs about the performance of specific programs or institutions	**Performance of Forest Service**	Performance of the Forest Service

Although the study is primarily concerned with belief change, indications of belief affirmation were also coded. Belief affirmation, whereby previously-held beliefs are confirmed, is not well-discussed in ACF literature. However, belief affirmation may be considered a form of policy learning, as individuals gather information to bolster long-standing policy beliefs. Evidence of belief affirmation was most often noted when participants replied with variations of phrases such as *"My beliefs are stronger than before…", "I see know that my fears about X were correct"*, or *"I feel the same way about X".*

In order to answer the second research question regarding the role of scientific and technical information in belief change, causation coding was applied. Causation coding is a method for labeling an individual's explanatory model for the relationships between a cause and an outcome (Saldana, 2013). Causation codes were applied to participants' statements about the cause of various policy problems as well as attribution of research, experience, or other causes for their own belief revisions. These statements were most often made in response to prompts during the interview inquiring about the source of belief change. During second-cycle coding, causal stories about belief change were grouped by four themes (**Table 4**) according to the type of influence on policy learning. These themes represent the participants' rationale for why they think their beliefs changed over time.

Table 4 - Categories of Policy-Oriented Learning Influences

Themes	Characteristics
Scientific or technical information	Reference to scientific research or technical information such as policy analysis or economic data that the individual either consumed or produced
Conflict resolution	Reference to consideration of new perspectives after previous threats to core values were resolved
Perception of environmental or social conditions	Reference to perceived changes within the environment, economy, or other social conditions as informing belief change
Direct experience with policy implementation	Reference to specific involvement with the implementation of forest management policy

4.4.2 Participant Attributes

In order to explore patterns in the data, participants were assigned descriptors for three primary attributes: professional affiliation, advocacy coalition, and their reaction to the NWFP when it was introduced in 1994.

4.4.2.1 Assigning Advocacy Coalitions

ACF scholars commonly assign research subjects to advocacy coalitions based on evidence of shared deep core and policy core beliefs and/or indication of coordinated activity (Jenkins-Smith et al. 2014). In order to examine patterns associated with belief change among the sample, participants were assigned to one of the three broad advocacy coalitions previously revealed in ACF national forest policy literature (Burnett & Davis, 2002; Sabatier et al., 1995; Salka, 2004). The study noted the presence of a **commodity coalition** (n=5) whose primary policy goals concerning national forest management are grounded in timber production and economic development, an **amenity coalition** (n=7) whose primary policy goals concern forest preservation, and a **scientific management coalition** (n=8) whose primary policy goals concern maximizing agency discretion and/or management according to scientific expertise. Assignment to advocacy coalition was achieved by analysis of the fundamental concerns participants raised in response to interview questions about problems facing Pacific Northwest national forests during the late 1980s and early 1990s. These statements revealed policy core beliefs about the nature of national forest issues and corresponding policy goals. Responses were analyzed for consistency with the three advocacy coalition policy core goals (Table 5) and participants were assigned to coalitions accordingly.

Advocacy coalition assignment was relatively well aligned with corresponding professional affiliations (Table 6). Each of the five timber industry affiliates were assigned to the commodity coalition based on their primary concerns about challenges relating to the production of timber during the pre-NWFP era. All six of the conservation affiliates interviewed were assigned to the amenity coalition. The majority of agency affiliates (72%) were assigned to the scientific management coalition.

Table 5 - Criteria for Advocacy Coalition Assignment

Advocacy Coalition	**Coalition Policy Core Goals** *(Salka,2004)*	**Topics of belief statements regarding major challenges facing national forests during 1980s-early 90s**
Commodity	Maximization of commodity production Economic well-being of forest-dependent communities	Legal gridlock preventing timber harvests Uncertainty regarding ESA listing of owls and potential effects for private timberlands Public values shifting away from multiple-use toward preservation
Amenity	Minimization of commodity production Forest preservation Prioritization of recreational opportunities	Loss of old-growth forest and/or dependent species Impacts to fisheries and aquatic systems associated with timber practices "Over-cutting" of timber USFS emphasizing timber production vs. preservation and/or recreation
Scientific Management	Maximizing agency discretion Preventing outside influence on decisions Application of scientific expertise	Political influences interfering with forest management Lack of science-based management Centralization of authority reduced USFS effectiveness Need for clear directives and policy

Table 6 - Advocacy Coalition by Professional Affiliation

Professional Affiliation	**Commodity**	**Amenity**	**Scientific Management**
Industry	5	0	0
Conservation	0	6	0
Agency	0	1	7
Academic	0	1	0

4.4.2.2 Reaction to the NWFP

It is important to note that shared advocacy coalition affiliation does not necessarily translate to shared policy core and secondary beliefs about all aspects of public policy. This study attempts to further distinguish individuals within coalitions by describing a policy core belief that is particularly relevant to the case study: the participants' past policy core preference

for the NWFP. Each participant responded to an interview question inquiring about their initial reaction when the NWFP was introduced in 1994. Answers revealed a range of policy core preferences regarding the sweeping policy change enacted by the NWFP.

Policy core preferences are policy core beliefs that are "subsystem-wide in scope, highly salient and have been a major source of cleavage for some time" (Jenkins-Smith et. al, 2014). Policy core preferences "project an image of how the policy subsystem ought to be" and provide "vision that guides coalition strategic behavior" (Sabatier & Jenkins-Smith, 1999). Because the NWFP operationalized normative values about forest management (i.e. a preference for landscape-level, ecological management vs. stand-level, sustained yield management), the researcher considers an individual's overall orientation to the NWFP as a policy core preference. Responses were sorted into a scale of thematic categories (Table 7) using *in vivo* descriptors from the transcripts, on a scale from "ecstatic" to "devastated." These descriptors are referenced in addition to advocacy coalition during discussion of the findings.

Table 7 - NWFP Preference Scale

Preference Scale	**Description**	**Advocacy Coalitions** (# participants)
"Devastated"	Individual reported absolute opposition to the NWFP.	Commodity (3)
"Concerned"	Individual reported serious misgivings about design of NWFP but not outright opposition.	Commodity (2) Scientific Mgt. (4)
"Inevitable" (Neutral)	Individual reported a neutral reaction, that the plan was bound to come into place regardless of their personal beliefs.	Scientific Mgt. (2)
"Good Enough"	Individual reported positive feelings about the NWFP but indicated room for improvement.	Amenity (3)
"Ecstatic"	Individual reported that NWFP was best possible policy outcome.	Amenity (5) Scientific Mgt. (1)

4.4 Methodology Limitations

Several limitations are inherent in the design and methodology of this study: sample size and composition; the reliability of self-reported data obtained through interviews; and potential bias on the part of the researcher in the interpretation of data.

The sample for this study represents only a small segment of individuals with a history of involvement with Pacific Northwest national forests. The sample size is too small to be considered representative, therefore the composition of participants cannot absolutely fully represent the range of individuals involved with or affected by national forest management policy in the region. Furthermore, the purposive, non-random sampling method favored individuals with professional affiliations with organizations and agencies who have remained involved, to some extent, with forestry issues.

The nature of the interviewing methodology poses limitations as well. In addition to the challenges of long-term memory recall, there is a matter of getting to interviewees "true" beliefs. Interviews face several challenges in this regard: the risk that the researcher's presence may bias responses, the fact that not all individuals are equal in their ability to articulate their beliefs (Creswell, 2014), and the tendency of organizational representatives to express "sanctioned" beliefs on behalf of their organizations rather than their true, personal beliefs (Jenkins-Smith & St. Clair, 1993). Another serious concern is that long-time policy actors may wish to avoid expressing beliefs that are inconsistent with previous public statements, so as not to damage their credibility (Jenkins-Smith & Sabatier, 1993).

Lastly, the findings are the result of the researcher's own interpretation and coding of the raw data. Decisions about what is important to code and how to assign categories to the data

were dependent upon the interpretation of the researcher (Thomas, 2006). Different researchers may produce findings that differ from these results, due to the inherent application of judgment associated with inductive analysis (Thomas, 2006).

5. Findings

This chapter presents the results of analysis of the 20 interviews with national forest stakeholders. The data and analysis of evidence of policy-oriented learning are discussed in terms of policy-core belief change, secondary belief change, belief affirmation, and the absence of belief change. Ther section concludes with a thematic analysis of the factors contributing to policy learning, including the role of scientific information, as reported by the participants.

5.1 Policy-Oriented Learning

In an effort to answer the first research question regarding the extent to which stakeholders have revised beliefs since adoption of the NWFP, open-ended interview questions elicited a range of policy beliefs, past and present, and directly inquired about belief change. This section describes the findings as they relate to the presence of policy core belief change, secondary belief change, belief affirmation, and the absence of belief change. The final sub-section summarizes the findings concerning the presence of policy-oriented learning.

5.1.1 Policy Core Belief Change: Policy Solutions to Systemic Problems

30% of participants revealed revisions of policy core beliefs concerning policy solutions to systemic problems. Beliefs within this theme were assigned to three different sub-themes according to topic: the **ability to advance ecological values through active management**, the

viability of scientific solutions to policy problems, or the **utility of wilderness and park designations**. The following sections elaborate on the belief change sub-themes as they relate to two categories of policy core beliefs per the ACF: the ability of society to solve a major problem or the priority accorded to various policy instruments.

5.1.1.1 The Ability of Society to Solve a Problem

Policy core beliefs regarding the ability for society to solve a given subsystem-wide policy problem concern an individual's propensity for technological optimism versus pessimism and one's belief in the potential for mutual accommodation versus zero-sum competition (Sabatier & Jenkins-Smith, 1999). Technological optimism is the doctrine that the application of technology and innovation can resolve environmental problems (Basiago, 1994). Applied to the area of forest management, technological optimism supports the concept that intervention and direct manipulation of resources can produce better ecological outcomes than if forests were left on their own. The concept of mutual accommodation is inherent in the principle tenet of the NWFP that management informed by scientific analysis can provide for the ecological integrity of terrestrial and aquatic systems while also providing timber and other resources for human needs (Shannon, 2004). 25% of participants discussed revisions in their beliefs regarding society's ability to solve forest management problems. These policy core beliefs were categorized under two topical sub-themes: 1) the ability to advance ecological values through active management and 2) the viability of scientific solutions to policy problems. While the former sub-theme reflects technological optimism, the later sub-theme embodies participants who became pessimistic about the ability of society to solve major forest management issues over time.

5.1.1.1a The Ability to Advance Ecological Values Through Active Management

In a turn toward technological optimism, two participants reflected upon new beliefs regarding the value of an ecosystem management approach. Both of these participants attributed direct experience with implementation of forest management plans to their revised beliefs.

An amenity coalition member remarked:

> "The bottom line is, I think we are part of the system, I think we've altered the system tremendously and even though I think there are places that we should do not one iota of management, I think there's other places that if we do the right kind of management, it really will have a benefit. I would say I didn't think that earlier on." (S16)

Another example came from the commodity coalition. This individual had expressed concerns about the NWFP when it was adopted and had spent the past twenty years implementing a Habitat Conservation Plan (HCP) on private timberlands adjacent to national forest lands. The participant's HCP had adopted the triad approach of the NWFP, including reserves that are off-limits to regular harvest, experimental adaptive management areas, and matrix lands that are the focus of intensive timber management practices. The participant remarked of the triad approach, "That was a very seminal, very important paradigm for me." Application of an ecosystem management approach on private timber lands influenced the scale at which this individual now thinks about forest practices:

> "I started out looking at what we do at the stand level because of my work with the foresters on timber harvests and such but I've learned now that the real key of it is looking at the landscape level." (S3)

This participant also disclosed having learned that benefits to wildlife can accompany timber production with the application of ecological management techniques:

> "I've learned there are so many things that managed forests can provide… I've learned through that process of management strategies and timber types and such

> what they can really provide out there for species. I'm constantly surprised at what well-managed private and state forests provide and how they support these species that maybe aren't being supported so well on federal lands, like game species, deer and elk that use the early and mid-successional [habitat]." (S3)

5.1.1.1b The Viability of Scientific Solutions to Policy Problems

15% of participants expressed having gained a sense of technological pessimism regarding society's ability to solve national forest management problems. These individuals reflected a contrary belief about the viability of an ecosystem management solution for managing both economic and ecological values on national forests. One scientific management affiliate "spent 15 kind of frustrating years doing research or inviting researchers to produce some models and alternative ways to manage forests to produce public goods for multiple objectives." His response reveals a change from a hope for a scientifically-informed solution that would mutually accommodate conservation and timber demands to a perspective that ecosystem management is a zero sum game in the current political environment:

> "I was still hopeful in '95 that we could solve this problem [managing for both conservation and timber values] technically. That hasn't worked out… You can produce the information but unless you have public policy to support it, it doesn't matter. So I just became more cynical… now I'm discouraged." (S19)

Similarly, an amenity coalition affiliate contemplated on a revision of prior confidence that science would "increasingly over time shape policy." The participant commented on the optimism that was shared among colleagues during the 80s:

> "We were attempting and we talked about changing society, [with] bio-centrism as an ethic. And we were only fifteen, sixteen years out from the first Earth Day. What, ten, less than ten years out from NEPA, NFMA, Endangered Species Act, Clean Water Act. So you start extrapolating in that trajectory and anything is possible." (S10)

The respondent reported experiencing a "retrenchment, a drawback" from this position overtime, eventually letting go of former convictions regarding the promise of scientific solutions to forest management issues:

> "A lots changed since then. Our revolution didn't come. Maybe Option 9 was the zenith of it. Instead you've got the inability to do anything on climate and the denial of science… it's an entirely different trajectory then we imagined in the mid or late 80s. It's a rearguard." (S10)

This participant reflected that his concept of the role of science in policy solutions has fundamentally changed, acknowledging the best they could hope for are "not permanent solutions but temporary demarcations of what we need to sustain particular ecosystems and processes and entities." This reconciliation echoes the commodity coalition affiliate in conceding that politics often supersedes scientific evidence, stating a newfound understanding that "science would only inform policy to the extent that we made it so, politically."

Lastly, a participant from the scientific management coalition reported a shift in his former convictions about the role of science in forest management policy. Over time, this participant's "sense of the values dimension [of forest management] has grown." Although a research scientist himself, this participant no longer assumes that forest management problems can be resolved solely by technical solutions, explaining:

> "Watching the forest wars and the pain and anguish that was being experienced through all that, it was clear that this was much more a struggle of values than of fact." (S17)

Similar to the other participants who have revised their beliefs about the viability of scientifically-driven answers for policy problems, this participant describes an understanding of the social constraints to technical solutions. However, unlike the other participants, this respondant also acknowledges inherent opportunities for value-driven solutions:

> "Science held particular sway in the Northwest Forest Plan formulation situation because of the circumstances around Judge Dwyer giving so much oomph to the scientists. But I think the next time we reimagine our relationship to public forest land, values will have a really big play. That's why we will need creative writers, musicians, and others to help us reflect on our values, what we want of the forests and watersheds of the future."

5.1.1.2 Priority Accorded to Policy Instruments

Beliefs about the importance and utility of various policy instruments to enact one's fundamental policy goals are also considered policy core beliefs. Policy instruments are tactics by which government agencies advance desired social or ecological outcomes (Vedung, 2011). Policy instruments are generally discussed in terms of governments influencing private sector behavior by way of regulatory or economic instruments (Vedung, 2011). Policy instruments in the realm of national forest management include tools such as standards and guidelines or zoning for management objectives in national forest management plans, administrative direction reflected in agency policy directives or Executive Orders, or direction from congressional laws and acts such as the NFMA, the Wilderness Act, NEPA, or ESA (Loomis, 2002). One amenity coalition affiliate revealed a revised policy core belief regarding the efficacy of congressional designations for advancing his policy core goals of forest preservation.

5.1.1.2a The Utility of Wilderness and Park Designations

During the decades leading up to the NWFP, the amenity coalition commonly pursued congressional wilderness designation or transfer of lands to the National Park Service as a primary strategy to advance conservation objectives (Yaffee, 1994). Congressional designations resolved uncertainty around potential administrative management decisions involving resource extraction or development. One amenity coalition affiliate reflects:

> "I came out of an era where we had a lot more confidence in things that you could designate: wilderness, national monuments, national parks. You drew a line

> around it, you had a more specific level of protection and management direction that went along with it." (S9)

This individual reported a major change in his preference for congressional designation policy instruments:

> "[My] biggest change was getting more comfortable with the recognition that simply drawing lines around places and protecting them as wilderness and parks is not efficient... we need to look across the broader landscape and I think climate change is making it even more imperative… the old way of just drawing lines around a place doesn't take care of it." (S9)

This policy belief change is particularly significant because the goals of environmental laws and design of conservation parks and wilderness preserves have been developed under assumptions of stable climatic conditions (Spies et al., 2010). Although the policies may be flexible enough to allow adaptive responses in many instances, it is not known generally whether there is social license for more flexible approaches (Spies et al., 2010).

5.1.2 Policy Core Belief Affirmation: Orientation to NWFP

Notably, 80% of commodity coalition members who were originally opposed to the NWFP reported belief affirmation about their policy core preference of the plan. These participants were "concerned" or "devastated" by the introduction of the NWFP. Their accounts emphasized the experience of having their predictions about the NWFP come to fruition – in essence, their beliefs about the fallacies of the plan were bolstered during the past two decades. One participant stated:

> "We were hoping it wouldn't but what we were crying wolf about has happened and so my views haven't changed yet, they've just been reinforced that I was correct. And I'm not trying to be arrogant about that at all and we weren't geniuses but it didn't take a brain surgeon to figure out what might happen and it did. Almost everything." (S11)

Consistently, these narratives emphasized affirmation in their opposition to the NWFP, a policy core preference, by citing the current state of national forests as evidence for their positions:

> "As a forester, you gotta say 'We are only going to cut 5% of the growth? What's going to happen here?' and we worried about it from the very beginning. Now we see that the forests are in an unsustainable condition." (S2)

Another participant elaborated on his perception of the condition of the national forests:

> "Our forests were healthy, our communities were healthy, and it provided for everybody and now it's not. They are locked up, they're rotting away, not providing a whole variety of habitat and they are being used just by a few elitist people. I think that's just wrong." (S10)

The persistence of opposition to this long-standing policy is notable. Although these individuals did not change their policy core beliefs, the assimilation of new information, observations, and experience supporting previously-held beliefs may be a form of policy-oriented learning that is currently not well-described in the ACF literature.

5.1.3 Secondary Belief Change: Distinct Forest Management Challenges

70% of participants reported revision of secondary policy beliefs concerning distinct forest management challenges. Secondary policy beliefs were assigned to three different themes according to their alignment with various types of secondary policy beliefs and eight sub-themes regarding substantive topics of secondary belief revisions (Table 8). The following sections elaborate on the secondary belief change themes and their corresponding sub-themes.

Table 8 – Secondary Policy Belief Learning Themes & Sub-Themes

Policy Belief Definitions *(Matti & Sandström, 2011; Sabatier & Jenkins-Smith, 1999)*		**National Forest Policy Learning Themes**	**National Forest Policy Learning Sub-Themes** *Belief change topics from interviews*
Secondary	*Perceptions of the severity of different aspects of a problem in specific locations*	**The severity of distinct forest management problems**	Catastrophic wildfire in fire-prone forests Early successional habitat on federal lands Over-stocked plantations
	Beliefs regarding causal drivers for problems in different locations over time		Threats to old growth in fire prone forests Decline of northern spotted owl
	Beliefs concerning administrative rules, budgetary allocations, policy implementation, and interpretation	**Policy solutions to distinct problems**	Flexibility of NWFP standards and processes Commercial thinning for restoration of plantations
	Beliefs about the performance of specific programs or institutions	**Performance of Forest Service**	Performance of Forest Service

5.1.3.1 The severity of distinct forest management problems

Perceptions of the severity of different aspects of a problem, including the causal drivers for distinct problems, in specific locations are considered secondary aspects of policy beliefs (Sabatier, 1999). The attribution of a causal driver behind a policy problem is significant because one's conception of the mechanism creating a problem suggests what range of solutions might be appropriate (Stone, 1989). The following sub-themes reflect the topics of participants' revised beliefs regarding the severity of distinct national forest management problems.

5.1.3.1a Catastrophic wildfire in fire-prone forests

Interviews were conducted at the end of the most extensive wildfire season in the Pacific Northwest in modern history, wherein over 3,800 wildfires in Oregon and Washington burned over 1.6 million acres, including national forest lands managed under the NWFP (USFS, 2016). Therefore, it is not surprising that 65% of study participants mentioned concerns related to

wildfires on national forest lands during interviews. Concerns included the impact of fire-fighting on Forest Service budgets, the loss of timber to wildfire, environmental impacts associated with fire retardants, and lost opportunities for post-fire salvage.

20% of participants explicitly expressed beliefs that catastrophic, stand-replacing wildfires had increased in severity over the past decades. The emphasis of most concern was perceived threats to fire-prone forests on the east side of the Cascades and in the southern regions of the NWFP area. Changes in one's perception of the severity of a problem in specific locations is considered a secondary policy belief (Sabatier & Jenkins-Smith, 1999). These four participants shared the perception that wildfires are burning at intensities and scales that are historically unprecedented. As one participant stated, "It isn't as though we haven't seen forest fires around here but nothing like we've seen in the last, say, certainly five years" (S7). This participant explained how fire affected his core policy goals of protecting old-growth and undisturbed forests, "An increase in fire puts protected places in jeopardy, in greater jeopardy than has historically been the case."

Two competing narratives about the causes of catastrophic wildfire were prevalent – one that emphasized the role of climate change and another that attributed the cause of wildfire to the lack of active management and harvesting on federal lands. A commodity coalition member explained:

> "The magnitude and intensity of the fires we have been seeing – we in the industry will go to our graves believing that it's because of the neglect our forests have been receiving and the heavy fuel loads." (S1)

5.1.3.1b Threats to old-growth in fire-prone forests

Related to the perception that wildfire severity has increased, one amenity coalition affiliate revised his beliefs about the causal driver affecting old-growth pine forests in the Eastern Cascades. As a result, this participant reversed his beliefs about management "from stay out of those forests that have pine in them to my God, we've got to get into these forests, those big pines are going to die because they are crowded and they are either going to burn up or die from competition!" (S20)

5.1.3.1c Over-stocked plantations

Another common theme was a new concern regarding high-density plantations at the sites of former clear cuts. 20% of participants reported concerns regarding the "biological deserts" (S5) created by seas of "overstocked, light-excluding forest on hundreds of thousands of acres" (S19). A scientific management coalition member lamented that the Forest Service faced regulatory constraints in addressing dense monocultures that created "riparian areas that are totally unnatural and totally not functioning" (S12). A commodity coalition member expressed an emotional response to the wasted resources within these aging plantations:

> "I have a hard time going to national forests 'cause I go to areas that we harvested timber and its abominable because here are these plantations that have never been thinned or anything and they are growing so close together that underneath on the forest floor it's a desert. There's no light or water that gets down to the forest floor. It's hard to go up and see that kind of forestry and mismanagement of the trees." (S13)

Common to each of these narratives was the suggestion that thinning needed to occur in order to remedy the condition of these forests.

5.1.3.1d Early successional habitat on federal lands

20% of participants, including three from the commodity coalition one from the amenity coalition, related beliefs that the drastic reduction in timber harvests on national forests over the past several decades had resulted in a loss of habitat for deer, elk, and other species that rely on early-successional forest for forage. The commodity coalition members drew a direct connection between diminished timber harvest and diminished wildlife populations:

> "We've got all these forests that are all mature and we've got species disappearing. So if you look at it as a wildlife thing, species like deer and elk, they've lost those herds." (S11)

> "I haven't seen any uptick in wildlife, in fact I think if you did a census of all different kinds of animals you would find out that wildlife is diminishing on the national forests simply because there's no more open areas anymore so your deer, your cougars, and other animals that need area for forage, some of your birds and stuff, they aren't there anymore, they're not doing any harvesting." (S13)

One participant from the amenity coalition revealed a new concern for the lack of early-successional habitat on federal lands:

> "Not only was I not concerned about early successional communities 20 years ago, but I dismissed people who were concerned about providing for a continuous harvesting program to provide openings and younger forests. And I did it on the basis that, first of all I thought it was going to happen elsewhere, and secondly that these communities were nothing but weedy communities anyways." (S20)

5.1.3.1e Decline of the northern spotted owl

Despite the large-scale effort to manage federal forests for northern spotted owl habitat, the species has continued to decline over the past two decades (USFWS, 2011). Surprisingly, although 35% of participants mentioned a perceived threat to the northern spotted owl as one of their major policy concerns during the late 1980s and early 1990s, only 1% mentioned the condition of the owl specifically as a current concern. Three commodity coalition members who were opposed to the NWFP made mention of the failure to recover the owl, as if citing the fact as

evidence against the tenants of the plan itself: “the main thing they were doing was protecting the spotted owls and the species has declined, so what the hell?” (S11)

Just one participant acknowledged a revision in his beliefs about the causal driver affecting decline of the northern spotted owl:

> “We thought if we saved a bunch of habitat and created more [we would save it], we didn’t take account on how consequential the barred owl was really going to be and the reality is I think it’s very possible that the only hope for the spotted owl at any scale is sustained removal of barred owls. There’s no question that the spotted owl will go extinct in significant portions of its range without that and maybe all of its range without that.” (S20)

5.1.3.2 Policy solutions to distinct problems

The following sub-themes regarding secondary belief change concern administrative rules, and policy implementation and interpretation related to distinct management problems. These belief revisions can be summarized under two sub-themes: a concern about the flexibility of the NWFP processes and guidelines for specific land types and a revised belief about the utility of commercial logging.

5.1.3.2a Flexibility of NWFP standards and processes

The NWFP was developed with the precautionary principle in mind, imposing a risk-averse management paradigm (Philpot et al., 2006). The NWFP not only prescribes management objectives for various land allocations but also requires managers to conduct several processes for forest planning, inventory, and monitoring such as survey and manage species assessment and watershed assessments (Philpot et al., 2006). The cautious nature of management standards and guidelines as well as the intensive processes associated with the NWFP are thought to limit the range of acceptable management activities on national forests (Philpot et al., 2006).

Correspondingly, 20% of participants, including two individuals who were involved with the FEMAT team, expressed misgivings about the restrictive nature of at least some of the NWFP requirements. One participant stated, "we didn't realize exactly what we were creating" (S16).

Of the watershed assessments required by the NWFP Aquatic Conservation Strategy (ACS), one person reflected that "it just created almost analysis paralysis where it was difficult for them to do those studies and actually glean from the results what needed to happen and support a program of work" (S8). A scientific management affiliate echoed concerns about aspects of the ACS, citing revisited fundamental assumptions about the nature of aquatic ecosystems. The respondant explained that the design of the NWFP aquatic strategy goes back to how scientists were thinking about aquatic systems at the time of the policy's inception:

> "The paradigm that dominated our thinking about aquatic ecosystems [was that] they are very static and the world doesn't work that way. What I've seen over the last 25 years… [is] that failure to recognize the aquatic ecosystems as dynamic… [is] really hindering achieving a lot of goals and objectives that we set out to achieve" (S12).

One amenity coalition member who had been a FEMAT member conceded to having changed his former beliefs about the types of management appropriate in late-successional reserves. Where this individual had formerly favored a hands-off approach, they now have concerns about "the lack of ability to thin and do management under the strict standards and guidelines" as wildfire poses increasing threats (S16). Revision of beliefs related to late-successional reserves was not limited to former FEMAT members, however. An amenity coalition member mentioned having changed previous convictions about restrictions regarding active management of older, fire-prone forests. The participant asserted, "on the east side we have fire regimes that are going to argue for looking at additional, in some cases, thinning, in other cases more prescriptive fire burning" (S9). This participant explains:

> "I don't think that we actually have to change the fundamental structure of the Northwest Forest Plan… but it probably means we need to go in and look at the standards and guidelines, sideboards for management for some of the systems and see if they need to be updated or modified or [have] more flexibility built into it." (S9)

One participant from the scientific management coalition revealed a contrary belief change regarding flexibility of standards and guidelines. This participant feels that the NWFP should become *less* flexible and more prescriptive in order to alleviate issues around inconsistent implementation of the plan:

> "I think the problem with science is that its not absolute and everybody translates it differently. And I think that was the problem before was that everybody was interpreting [the NWFP] differently and I think... I think that's where some of the decisions need to be made at a higher level." (S8)

5.1.3.2b Commercial thinning of plantations

One amenity coalition member, who previously supported a total ban on commercial logging on national forests, now advocates commercial thinning as the best way to address overgrown plantations, asking:

> "Isn't it ironic that given the sorry ecological state of these god-awful plantations that the judicious use of the chainsaw can be helpful in putting those stands on track toward ecological restoration faster than what would occur if you would have just let them sit?" (S5)

Although the participant divulges a revised stance on the potential utility of active timber management, this individual hasn't *completely* revised beliefs about commercial logging:

> "My position is, well, I'm not opposed to somebody making a profit if it's not harmful to the forest… I still favor the end of commercial logging on federal lands, it's just later – not now." (S5)

5.1.3.3 Performance of the Forest Service

30% of participants, including individuals from all three coalitions, revealed beliefs that the performance of the Forest Service has changed overtime. Participants described an agency hobbled by process and fear of litigation, unwilling or unable to assume previous leadership roles, and suffering a lack of funding. Two of these participants suggested that the Forest Service was already on a trajectory of lost capacity and leadership well before the early 1990s and that the current status of the agency only affirmed their previous beliefs about the performance of the agency. A commodity coalition member described the Forest Service of the era preceding the NWFP:

> "The Forest Service started to lose its ability to do things, they started to question the values they held previously, began to question if someone says we shouldn't do that, well maybe we shouldn't, what do you think? And that was the beginning of that same position of being unable to rationalize and justify a decisive course of action. You see what is their policy is now, well its collaboration, which means asking other people to tell us what to do or asking other people permission to do things." (S2)

The participant concluded, "It seems to me the Forest Service has gotten further and further behind." An exception to this narrative was a commodity coalition member who had formerly enjoyed a strong partnership with the agency before the NWFP era. This individual lamented the perceived decline:

> "When I first started, the Forest Service was a real role-model to me.... they were right on the leading edge of research, management strategies, and cooperative approaches across managed forest lands. But now, due to this analysis paralysis that's just really hammered them, they are kinda you know… a crime victim chalk outline…. I just don't look to the Forest Service to work together with me like we did in the past..." (S3).

Despite their perception of an underperforming agency, two amenity coalition members reported beliefs that overall the Forest Service had improved over the past 20 years as the agency had shifted attention away from its timber program. One participant reflected:

> "I think the Forest Service has gotten better at recognizing because timber is no longer as dominant a role on the forest as it historically used to be, I think they have now started to pay more attention to the other resource values of the forest, water quality, health of watersheds, you know fish and wildlife and recreation." (S9)

Another amenity member expressed surprise at his own lament regarding the agency's declining funding and capacity:

> "One of those things I've been surprised at is, given [my] unhappiness with the agency in the 70s and 80s with their involvement with the timber guys, [is] lamenting the fact that the agency is much smaller and really much less capable of just holding on to their own venue. Yeah. I wouldn't have thought that, would have said well that's what the bastards deserve... (laughs)." (S7)

Although both of these amenity coalition participants characterized the Forest Service as having improved, an air of mistrust still remains. Cautions one participant:

> "While I think a lot of change has occurred, I think there is still a legacy of longing… to go back to the quote 'good old days' or at least move back in that direction." (S9)

5.1.4 No Belief Change

A total of 20% of participants were unable to identify any revised beliefs, nor did they report affirmed beliefs. Three of these individuals were scientific management coalition members who were retired from national forest careers, two of whom reported that they were no longer actively thinking about national forest issues. One participant summed it up, "We dealt with a lot of baggage… and in a lot of ways were happy to retire" (S14).

The amenity coalition member who reported no belief change also indicated a level of estrangement from the policy subsystem, stating, “I can’t put my finger on having really learned anything… I find national forest issues much less interesting than I did back then” (S6).

Lack of belief change or affirmation in the transcripts does not necessarily mean that the individuals did not revise any beliefs. These results could also be a result of interviewer error, such as failure to follow-up and probe a particular subject, or simply a limitation of the participant’s ability to identify and reflect upon belief change during the interview. Furthermore, statements regarding changed attitudes or beliefs were not coded for analysis unless the topic of the beliefs could be clearly tied to ACF policy belief constructs.

5.1.5 Summary of Policy-Oriented Learning Results

Central to the study is the research question: “To what extent have stakeholders changed their policy core and/or secondary policy beliefs about Pacific Northwest national forest management policy since adoption of the Northwest Forest Plan?” The purpose of this research question was to determine whether there was evidence of policy-oriented learning within the policy subsystem. The majority of participants (80%) indicated at least one revision of a policy core or secondary policy belief, while the remainder of participants expressed no change at all. Out of those who changed policy beliefs, 68.8% of individuals indicated revision of more than one policy belief. 71% of those who revised policy core beliefs also revised secondary beliefs while only 36% of participants who revised secondary beliefs also revised policy core beliefs. Belief change varied across coalitions (Table 9).

Of the individuals who revised beliefs, 35% noted change in policy core beliefs concerning the fundamental nature of policy solutions for subsystem-wide problems. The

amenity coalition revealed the greatest magnitude of policy core belief revision, with 50% of all amenity coalition members reporting policy core belief change. Notably, 80% of the commodity coalition reported that their previous policy core beliefs about the NWFP were not only unchanged but affirmed by over two decades of experience with the policy change. The contrast of policy core belief change and affirmation between the amenity and commodity coalitions, respectively, raises questions about the lingering conflict within the subsystem.

Table 9 – Percentage of Participants Reporting Belief Change by Coalition

Coalition	Policy Core Belief Change	Policy Core Belief Affirmation	Secondary Belief Change	No Change
Amenity (*n=8)*	50%	-	75%	13%
Commodity (*n=5)*	20%	80%	100%	-
Scientific Mgt. (*n=7)*	29%	-	43%	43%
Total (*n=20)*	**35%**	**20%**	**70%**	**20%**

Most of the belief changes occurred, as expected per the ACF (Weible et al., 2009), with secondary policy beliefs. Secondary policy belief change was markedly present among commodity coalition members, 100% of whom reported revised beliefs about the severity of problems facing national forests or the performance of the Forest Service. The majority of the amenity coalition (75%) also revealed secondary policy belief changes. The scientific management coalition indicated the least amount of secondary belief change (43%) and policy core belief change (14%) and composed the largest percentage of individuals who expressed no belief change at all (43%). Table 10 summarizes belief change results by specific themes and advocacy coalitions.

Table 10 - Summary of Belief Change Results by Theme and Coalition

National Forest Policy Learning Themes (% of participants)		**Belief Change Topics**	**Advocacy Coalition** (# Participants)
Policy Core	**Policy solutions to systemic problems** (35%)	Ability to advance ecological values through active management Viability of scientific solutions to policy problems Utility of wilderness and park designations	Amenity (4) Commodity (1) Scientific Mgt. (1)
Secondary	**The severity of distinct forest management problems** (50%)	Catastrophic wildfire in fire-prone forests Early successional habitat on federal lands Over-stocked plantations Threats to old growth in fire prone forests Decline of northern spotted owl	Amenity (3) Commodity (3)
	Policy solutions to distinct problems (25%)	Flexibility of NWFP standards and processes Commercial thinning for restoration of plantations	Amenity (3) Scientific Mgt. (2)
	Performance of Forest Service (30%)	Performance of Forest Service	Amenity (2) Commodity (3) Scientific Mgt. (1)

5.2 Factors Contributing to Belief Change

The study sought to document the influence of scientific and technical information in individuals' revision of policy beliefs. While four participants cited research that informed their current beliefs, others spoke to personal experiences or had trouble identifying factors that influenced their beliefs. Indeed, the phenomenon of belief change may be difficult for an individual to identify, much less explain. One participant summed up the influences on his beliefs as "partly revelation, science, and social change" (S20). Variables affecting belief change include the following:

- **Scientific or technical information** – Published research or participation in generating research influenced belief change
- **Conflict resolution** – Beliefs changed after core values were no longer threatened
- **Perception of environmental or social conditions** – Anecdotal assessment of the state of the world influenced belief change
- **Direct experience with implementation** – Participation with policy implementation contributed to belief change

The above policy learning themes were not mutually exclusive – in some cases individuals cited both scientific information and conflict resolution as factors in belief change, for instance.

5.2.1 Policy Learning Influences

This section reviews findings for each of the policy learning themes derived from the data: scientific or technical information, conflict resolution, perception of environmental or social conditions, and direct experience with implementation.

5.2.1.1 Scientific or Technical Information

20% of participants, including two individuals from the amenity coalition and two individuals from the scientific management coalition, cited scientific research as influences in altered beliefs. For two of these participants, it was the act of producing research that influenced their beliefs, while the others referenced consumption of studies related to climate change impacts as most influential. References to specific studies were vague, but individuals were able to describe the types of information that changed how they thought about policy issues. When asked about what influenced the amenity coalition affiliate's policy core belief change regarding

the utility of wilderness designations, the participant cited a range of climate change and wildlife connectivity research:

> "…modeling that looked at corridor and connectivity issues, habitat overlays, there was a lot of migration overlays, simply a lot of good scientific research that was being put together that sort of overlooked the issue of [land] ownership in terms of establishing those basic patterns and basic needs." (S9)

5.2.1.2 The Role of Conflict Resolution

15% of participants noted that the conditions fostered by the NWFP may have made them more open to scientific findings about the potential for active timber management to improve conditions in forests. These participants were amenity coalition members who had previously opposed the Forest Service's timber practices. One participant reflected:

> "The facts on the science – forest management and seeking to cut trees as a byproduct to try ecologically sound restoration thinning, I'm fine with that. I only have the quote 'luxury' of that opinion after the roar of the chainsaws had quieted." (S5)

Similarly, another amenity coalition affiliate remarked that it took him years of working with the Forest Service in the post-NWFP era to gain trust in the agency to apply scientific principles when conducting restoration:

> "I confess, looking back at my own transition… when I understood the science and when I brought my advocacy fully in line with the science, there is a bit of a gap there mostly explained by a lack of trust in the agency to do restoration the way it needed to be done." (S4)

A third amenity coalition member referred to the role of conflict resolution in making him more amenable to consider commodity values associated with national forests, reflecting that their "hard edge on timber issues is ameliorated just a bit." This individual recalled that in the 70s and 80s, forest policy was "all about timber – how much timber are we going to end up

with, and how much are we gonna protect." Timber harvest is no longer a major concern for this participant because "the Northwest Forest Plan changed that balance."

5.2.1.3 Perception of Environmental or Social Conditions

Perception of environmental or social change was noted when individuals described anecdotal evidence of changing conditions as influencing their beliefs. 55% of participants, including six from the amenity coalition and all five from the commodity coalition, referenced their perception of environmental and/or social conditions as factors affecting revised or affirmed beliefs.

An amenity coalition affiliate cited his experience observing and researching the large-scale disturbance at Mt. St. Helens as influential in changing his beliefs about the importance of early successional landscapes:

> "What really educated me was Mt. St. Helens and the incredible richness and biological diversity that happened in that landscape because it was a big early successional landscape – it still is. You know its evolving and moving through succession as well and it's just so rich in species and so many of them are habitat specialists that it clarified for me… that's a very important period. I also discovered how much longer it lasted than I imagined it did." (S20)

As discussed earlier, the perception of increasing catastrophic wildfires in eastern Cascades and other fire-prone forest in the region was a major driver for secondary policy belief changes regarding the appropriate level of management in these affected forests. Perception of both changing environmental and social conditions was cited by commodity coalition affiliates who affirmed their opposition to the NWFP. Two amenity coalition members referred to having seen areas that historically did not burn as evidence of climate change and heightened risk for fire-prone forests in the Northwest. On the contrary, two commodity coalition members, also concerned with a perceived increase in wildfire threats, noted anecdotal evidence regarding

wildfire patterns and land ownership to counter amenity coalition claims. One participant observed:

> "There's no question that this year has been very dry but people have been jumping on this climate change bandwagon to explain the fires. But the one question I have is how come all the intense fires are on federal lands and not on private lands? Our private lands are subject to the same climatic variations but we don't have huge fires on our lands, they only happen federal lands. Someone ought to explain that." (S1)

100% of the commodity coalition affiliates who reported having upheld their policy core preferences opposing the NWFP cited perceptions of changing social conditions as influential to their positions. These participants attributed the decline of rural communities and the loss of milling infrastructure to NWFP implementation and as factors bolstering their policy core preferences regarding the plan. One individual explained:

> "I look back and I don't know what good has come out of this forest plan. All of our mills, we've lost almost all of our family-owned mills, our pulp mills, the whole infrastructure of the timber industry is vanishing… So that infrastructure is killing us and that's because of the forest plan." (S13)

5.2.1.4 Direct Experience with Implementation

25% of participants cited their experiences developing and implementing management plans at specific sites as influential in learning and belief change. A commodity coalition affiliate credited experience developing and implementing a Habitat Conservation Plan (HCP) on private timber lands adjacent to and intermingled with National Forest Lands with a changed perspective. This participant cited his nearly 20 years of experience with the HCP as changing his beliefs about the appropriate scale for forest management (landscape scale vs. stand scale) as well as his new understanding of the ability of managed lands to provide for wildlife habitat.

One amenity coalition member cited the "poetic justice" of trying to implement the NWFP that they had helped develop as part of the FEMAT, when the participant later took a leadership role at a fire-prone national forest: "It was much easier for me to critique proposed Forest Service activities than it was to try to do them in an environmentally-sound, economically smart way." (S16)

A scientific management affiliate reflected upon the experience of observing implementation of the NWFP they had helped develop with FEMAT:

> "I guess nobody really anticipated how that little experiment would play out with so many different administrative units and all the local forces that are in play. You've got some Forest Service field units that have a lot of local activism and people are overlooking your shoulder in everything you do and challenging every decision and you've got others where the folks roll up their sleeves and get involved and help them plan activities and there's a lot of local buy in and pretty much in-between. So I guess also I didn't have a good appreciation for just all the different dynamics and forces that are at play in these administrative units as you try to carry out, you know, a broad plan like the Northwest Forest Plan." (S8)

5.2.2 Summary of Factors Contributing to Belief Change

The second research question asked, "Have stakeholders changed their policy core and/or secondary policy beliefs in light of new scientific or technical information?" One of the key assumptions underlying the NWFP was that the plan's adaptive management and monitoring components would generate new knowledge and understanding that would inform adjustments in the plan (Stankey, Clark, & Bormann, 2006). The second research question attempted to establish whether the scientific research and technical policy analysis generated over the two decades of NWFP implementation influenced beliefs about policy within the subsystem.

Analysis revealed four primary themes for influences on belief change: scientific or technical information; the role of conflict resolution; perception of environmental or social

conditions; and direct experience with policy implementation (**Table 11**). The four factors influencing policy learning identified by this study were not mutually exclusive, as some individuals cited more than one factor when attributing causes for belief change.

Table 11 – Summary of Policy Learning Influences

Themes	**Characteristics**	**Response** (% of participants)
Scientific or technical information	Published research or participation in generating research influenced belief change	20%
Conflict resolution	Beliefs changed after core values were no longer threatened	15%
Perception of environmental or social conditions	Anecdotal assessment of the state of the world influenced belief change	55%
Direct experience with policy implementation	Participation with policy implementation contributed to belief change	25%

The findings regarding the role of scientific and technical information were inconclusive. Although 20% of participants cited research as an influence in their respective belief changes, it is difficult to attribute belief change solely to the consumption of scientific or technical research. Many studies indicate that science is used to support preexisting beliefs and to bolster arguments against opponents (Weible et al., 2009). Further, the absence of a counterfactual situation makes it impossible to unequivocally demonstrate that learning would not have taken place had the individual not consumed particular scientific evidence (Bennett & Howlett, 1992).

Notably, 37.5% of amenity coalition members cited the resolution of conflicts about timber harvests as a mediating factor in their belief revisions. For these participants, research alone was not enough to alter their convictions, as they were unwilling to accept scientific evidence when their core values were threatened. For the majority of participants (80%), consumption of evidence by experts was not a primary influence for belief change. Instead, these

individuals were more likely to refer to their own experiences and interpretation of conditions as influencing their changing beliefs.

6. Conclusion

This final chapter discusses the findings in light of ACF literature, offers potential explanations for the findings, recommends additional research related to policy learning and belief change, and lastly, suggests some implications of the study.

6.1 Discussion of Results

The so-called "timber wars" of the 1980s and early 1990s busied the courts and spurred dozens of congressional hearings with competing arguments about how best to national forest resources in the Pacific Northwest. Controversies developed around the scale, locations, and intensity of timber harvests and the appropriate strategy for conserving late-successional forests as well as endangered and threatened species. Both the amenity and commodity coalitions litigated Forest Service actions and attempted to advance legislative solutions. Ultimately, the NWFP was crafted in large part by members of the scientific management coalition, as a team of agency leaders and scientific experts crafted policies that would guide the region's national forest management for decades to follow. With its emphasis on ecosystem management and accompanying objectives for socioeconomic benefits for forest-dependent communities, the NWFP was introduced as a new paradigm and, perhaps, a panacea for the complex conflicts around forest management practices.

This study endeavored to examine the belief systems of individuals with over 20 years of involvement with Pacific Northwest national forest policy discussions and decisions. The study sought to establish whether policy-oriented learning, in the form of belief change, occurred among long-time stakeholders of Pacific Northwest national forests since adoption of the NWFP and to discern the extent to which scientific research informed belief change by answering the following two research questions:

1. Have stakeholders changed their policy core and/or secondary policy beliefs about Pacific Northwest national forest management policy since adoption of the Northwest Forest Plan?
2. Have actors changed their policy core and/or secondary policy beliefs in light of new scientific or technical information?

The following two sections discuss the results for each of these research questions in light of ACF literature and suggest possible explanations for the findings.

6.1.1 Discussion of Research Question #1 Results

At first glance, the evidence of belief change garnered by this study aligns with the ACF assumption regarding the malleability of policy beliefs. Consistent with ACF theory, which posits that policy core beliefs are not readily susceptible to change (Jenkins-Smith et al., 2014), evidence of policy core belief change was limited to just 30% of the sample. Contrary to far-reaching policy core beliefs, secondary aspects of policy beliefs are concerned with discrete aspects of the policy system, characterized by the substantive policy decisions and information necessary to implement policy core beliefs (Jenkins-Smith et al., 2014). Because secondary beliefs are generally informed by observable and measurable information, they are more subject to change (Jenkins-Smith et al., 2014). Consistent with theory, this study found that 80% of participants altered a range of secondary beliefs concerning the nature of distinct forest

management problems, the policy solutions to such problems, and the overall performance of the Forest Service. Four individuals were unable to identify any noticeable change in their beliefs at all.

In whole, the study found evidence of policy-oriented learning among 80% of participants. These results suggest that participants have adapted their belief systems to new information and may be amenable to changes in forest management practices and policies that align with their revised beliefs. However, there were discrepancies between the amount of individuals within each coalition who reported belief changes and the nature of belief changes within each coalition. For instance, 100% of commodity coalition members altered secondary policy beliefs. These revisions consisted entirely of beliefs that environmental and social conditions have deteriorated and that the performance of the Forest Service has worsened over the past decades since adoption of the NWFP. Paired with the observation that 80% of the commodity coalition reported affirmation of their opposition of the NWFP, these secondary belief change results may be interpreted as supporting evidence for the policy core belief affirmation. As the ACF literature to date largely ignores the phenomenon of belief affirmation (Weible et al., 2011), these findings warrant further research.

The variation of belief change results across coalitions is noteworthy. Policy core belief change varied greatly among the three coalitions, with 50% of amenity coalition members reporting policy core belief change, 20% of commodity coalition affiliates, and 29% of scientific management coalition affiliates. Meanwhile, the scientific management coalition reported the least amount of secondary belief change with only 43% of members revising beliefs, and the greatest amount of no belief change. In total, 20% of participants reported no belief change or affirmation. In the policy arena, those who do not adapt their beliefs to changing conditions and

new information may be at a competitive disadvantage in realizing their policy goals (Jenkins-Smith & Sabatier, 1993). Based upon a review of literature and the findings of this work, the author suggests three primary factors for the lack of learning among all participants, none of which are mutually exclusive:

1. The persistence of conflict in the policy subsystem
2. The closed process to develop the NWFP
3. Incomplete implementation of the NWFP

The following sections elaborate on these conclusions.

6.1.1 Persistence of Conflict

The ACF offers four types of explanatory factors for the phenomenon of policy-oriented learning: participation in professional forums in which coalitions interact and exchange dialogue, the level of conflict between coalitions, the tractability of the issue, and the attributes of the actors' belief systems themselves (i.e. the extremity of belief systems) (Jenkins-Smith et al., 2014). While this study is unable to determine the role of each of these factors within the subsystem, the continued presence of conflict has been noted during the analysis.

The ACF predicts that individuals will exhibit "devil shift" during times of conflict. Devil shift is described as the behavior of coalition members who "exaggerate the negative motives, behavior, and influence of opponents" (Weible et al., 2009). Devil shift was noted throughout the transcripts, particularly regarding the influence and intentions of the the amenity coalition. For example, one commodity coalition affiliate explained of the amenity coalition:

> "The environmentalists are still suing the Forest Service on timber sales, they don't care what it is, if it's a thinning, if its lowering fire hazards… salvaging

> forest fire wood, doesn't matter what it is, they are still fighting each one of those so the Forest Service is totally unable to operate." (S13)

Devil shifting regarding the amenity coalition was not limited to commodity coalition members. Scientific management coalition members as well as two amenity coalition members also echoed the theme that conservation interests held power over the Forest Service and that environmentally-driven lawsuits impaired management. A participant affiliated with the scientific management coalition member explained:

> "I think the Forest Service was just subjected to continuous pounding by [environmentalists] and the small, narrow influence of the timber harvesters and purchasers… they are the ones who are impacted the most, that have the least amount of power, they just couldn't compete with that." (S19)

The blame and exaggeration of power against sectors of the amenity coalition suggest persistence of conflict in the policy subsystem.

6.1.2 Closed Process to Develop the NWFP

Previous studies have suggested that top-down, science-based policy initiatives have increased opposition by those coalitions who were negatively affected by the implications from the scientific results and also excluded from the deliberations that informed the policy-making process (Weible et al., 2009). Initiated by the President and crafted by a team of interdisciplinary scientists during three months of meetings closed to the public, the NWFP was a top-down science-based policy initiative of unprecedented scale. Two responses from commodity coalition members summarize the sentiments:

> "You know, that was done so quickly, I mean a week and they had it all figured out. How they came up with that – they came out with their EIS, the Plan, they didn't take anybody's ideas. They didn't care what your response was, they just did what they wanted to do. And you know, when that happens to you, you feel pretty helpless, hopeless, you know, in changing things." (S13)

> "I think as an industry and as a land manager and a professional forester and a citizen it just seemed like our hands were tied. It was just a process that was going to happen and no say at all. I mean there was no way to push back to any common sense or anything. So when President Clinton came it was a done deal and they closed down the national forest, period. No good science, nothing." (S11)

A comment by a scientific management coalition affiliate who did not report belief change reveals that dissatisfaction with the process to develop the plan was not limited to the commodity coalition:

> "We joked about the Pink Tower but literally a bunch of wonks worked on that and I mean many of them are our friends and they did bring some Forest people in but not any of the planners that were really implementing this thing on the ground." (S15)

Ultimately, one's opinion of the process by which a major policy change is enacted may influence the individual's motivation to participate in the subsystem and their disposition to consider new ideas and policy solutions. Perceptions of a closed process to develop the NWFP may in part explain the prevalence of policy core belief affirmation among commodity members who were opposed to the plan.

6.1.3 Incomplete Policy Implementation

The NWFP aligned with the policy core beliefs of amenity coalition members, as evidenced by the positive reaction that participants had when the policy change was enacted in 1994. Furthermore, although the NWFP *intended* to provide a sustainable timber supply and meet the needs of rural communities, timber sales have never met the annual probable sale quantity predicted by the plan (Grinspoon & Phillips, 2015) . Study participants from all coalitions referred to the failure to meet projected timber sales under the plan and suggested that the "compromise" inherent in the NWFP was not fully realized for both coalitions. A commodity coalition member reflected:

> "The implementation just never occurred. All the conservation reserves were implemented to a high degree and none of the harvest levels ever were met and so on. So that was a grand bargain and big agreement that again never came forward. When it became apparent that the Northwest Forest Plan was not going to be implemented as passed, I began to feel cynical." (S19)

In effect, the commodity coalition's policy core goals remained threatened by NWFP while the amenity coalition's policy objectives were being advanced. Individuals who feel that their policy core beliefs are threatened may reject new information that undermines their belief systems, therefore preventing policy-oriented learning (Jenkins-Smith et al., 2014).

Another aspect of plan implementation, or lack thereof, that may have stunted policy-oriented learning within the subsystem was the failure to fully implement the adaptive management components of the NWFP. A fundamental strategy of the NWFP was the creation of 10 adaptive management areas (AMAs) comprising a total of over 1.5 million acres to test new management strategies. The assumption underlying the role of adaptive management in the plan was outlined by FEMAT: "If we cannot learn to manage adaptively, gridlock and paralysis will continue and both the biological and social dimensions of the federal lands will suffer" (FEMAT, 1993). The intention of AMAs was, over time, to generate new knowledge and information that would eventually inform changes to the NWFP itself (Stankey et al., 2006). However, implementation of AMAs has been incomplete (Stankey et al., 2006). Given the scientific management coalition's concerns with the application of science, lack of adaptive management implementation may have stunted opportunities for learning among scientific management coalition affiliates.

6.1.2 Discussion of Research Question #2 Results

The study found that scientific research did not play a decisive role in influencing belief change among participants. While four individuals cited the consumption or generation of research, it did not appear to be the prominent factor influencing belief change. For three additional individuals, the influence of scientific information appeared to only affect belief change once they perceived that conflicts related to their policy core goals were resolved. These results support previous findings regarding the relationship between the use of scientific information and the level of conflict within a subsystem (Weible, 2008) and suggest that the mitigation of conflict may enhance receptivity to scientific information.

Overall, participants were more likely to cite their own personal experiences and perceptions of environmental change than technical information produced by experts. In particular, 68% of participants who reported belief change referenced anecdotal observations regarding their perception changes within of environmental or social conditions as affecting their beliefs. Although the ACF acknowledges the role of socioeconomic changes and environmental changes in influencing the constraints and resources of subsystem actors (Jenkins-Smith et al., 2014), the literature does not appear to explore the ways in which individual interpretations of such changes might affect policy beliefs.

Lastly, the role of direct experience with implementation of policy appeared to be a strong influence in policy core belief change. Although the ACF model of the policy process illustrates "policy outcomes" as an influence in coalition member's beliefs (Jenkins-Smith et al., 2014), the role of policy implementation in supporting learning did not appear as a discrete theme within the author's review of ACF literature.

The indication that scientific information did not play a decisive role in policy belief change is surprising given the NWFP's emphasis upon the application of ecological the emphasis on implementation monitoring and research accompanying the plan. The weak influence of science upon belief change despite the availability of research and analysis about the environmental and social conditions within the subsystem may counter one of the five policy-oriented learning hypotheses of the ACF (Jenkins-Smith et al., 2014):

> "Problems for which accepted quantitative data and theory exist are more conducive to policy-oriented learning across belief systems than those in which data and theory are generally qualitative, quite subjective, or altogether lacking."

I posit four possible explanations for the findings regarding the limited role of science in affecting belief change:

1. Inadequate Dissemination of Research
2. Biased Assimilation Effect
3. Persistence of Conflict in the Subsystem
4. Wicked Policy Issues

The following sections elaborate upon these conclusions.

6.1.2.1 Dissemination of Scientific Findings

The performance of the NWFP and the ecological and socioeconomic conditions within the region have been well-documented through peer-reviewed journal articles, books, and government reports (Grinspoon & Phillips, 2015; Philpot et al., 2006; REIC, 2015; Spies & Duncan, 2009; Thomas et al., 2006). However, this information may not be widely disseminated. For instance, a comment by a commodity coalition affiliate suggests a lack of awareness regarding the results of implementation monitoring:

> "I'd like somebody to tell me what positives have happened, cause unfortunately nobody's ever quantified anything after that plan." (S13)

6.1.2.2 Biased Assimilation Effect

Another explanation may be the phenomenon known as biased assimilation, whereby individuals interpret arguments and evidence in a manner that supports their existing beliefs (Henry & Dietz, 2012). Thus, consumption of scientific information may be unlikely to alter one's beliefs when it is simply interpreted as bolstering an individual's current understanding. Furthermore, the tendency for actors from different coalitions to interpret scientific information in ways which support their policy core beliefs can lead to mistrust between coalitions and further advances conflict in the policy subsystem (Henry, 2011).

6.1.2.3 Persistence of Conflict in the Subsystem

Previous ACF research has demonstrated that the level of conflict within a policy subsystem has implications for the influence of science and technical information (Weible, 2008). The influence of conflict resolution, referenced by several amenity coalition members as paving the way for belief change, may be a prerequisite for one's willingness to consume evidence that contradicts their prior beliefs. This phenomenon may explain why commodity coalition members that were "devastated" by the NWFP, and whose core values remain threatened, expressed policy core belief affirmation rather than belief change.

6.1.2.4 Wicked Policy Issues

Lastly, a final explanation for why science was not a particularly strong influence upon belief change may be attributed to the notion that Pacific Northwest national forest policy issues are inherently value-laden. Nie (2003) asserts that political conflicts regarding natural resources tend to be "wicked problems" that go beyond rational, technical and scientific methods of

problem solving. Indeed, the competing policy-core beliefs around the purposes of national forests and objectives of forest management may have little to do with science. Lee (2009) suggests that the dominant worldview of forests has changed from the rationality that emerged during the Progressive Era and dominated most of the Twentieth Century, whereby values are separable from fact. Rather, he proposes that a post-modern perspective of forests now dominates, whereby the forests embody sacredness, "a manifestation of spiritual yearnings", and a "symbolic refuge from an increasingly commercialized world" (Lee, 2009). The emergence of a post-modern perspective of forests within the amenity coalition may hamper scientific dialogue and learning. A scientific management affiliate observed:

> "I felt that the arguments [about forest management] were portrayed as science arguments – and scientists were participating in a lot of the debate – but they were really values, personal and public values. That isn't the realm of science." (S17)

6.2 Future Research

Several themes and findings surfaced by this study research related to policy-oriented learning did not appear to be widely discussed in the ACF literature and may merit further examination. Foremost, the significance of belief affirmation is not well understood. In their synthesis of the first twenty-five years of ACF literature, Weible et al. (2011) asked, "Does not reinforcement of beliefs, which would reduce uncertainty in the world, also represent an indication of learning?" Inquiry into the role of belief affirmation may edify understanding of policy-oriented learning and policy change (or the absence of policy change). Similarly, the ACF literature does little to explain the absence of policy-oriented learning. Again, Weible et al. (2011) queried, "What are instances of nonlearning?" This study identified four individuals who expressed no belief change. However, due to the dearth of discussion about "nonlearning" it is difficult to place these findings in the context of ACF theory. ACF scholarship's emphasis on

belief change and policy change may bias researchers to ignore potentially important cases where change or learning is not present.

Another notable area for exploration includes the array of influences upon policy belief change. For instance, an individual's experience with the implementation of a policy appeared to influence policy core beliefs. This form of policy feedback and learning may be important as policies are updated over time. How does implementation-influenced learning diffuse through coalitions? To what extent do actors consider information direct experience with implementation as a form of "expert knowledge"? Does direct experience suffer the same bias assimilation as scientific information or does first-hand involvement with policy implementation affect an individual's receptivity to new or challenging policy beliefs? These questions warrant further inquiry.

Lastly, tactical adjustments in an individual's advocacy approach may be a kind of policy learning (Lertzman, Rayner, & Wilson, 2009). Two participants reported having altered strategies for advancing their policy objectives over time, participating in collaborative approaches for forest management decisions. Future research could investigate the ways in which policy actors change their advocacy approach over time and whether tactical adjustments are related to belief change. Similarly, many individuals noted a reconciliation between what they thought needed to happen (ecologically or socially) and what they thought *could* happen given the political situation. This reconciliation of the true belief and the political reality is extremely interesting – especially in the context of ecosystem management where decisions, in theory, are made based upon scientific information rather than political viability.

6.3 Implications

As the Forest Service attempts to update forest management plans amended by the NWFP, the presence of new, revised beliefs and those beliefs that have also endured will influence the direction of policy change within the subsystem. Ultimately, "policies are translations of values and belief systems" (Jenkins-Smith et al., 2014). Belief revisions among amenity coalition members suggest that this sector of stakeholders may be less resistant to active management practices, particularly thinning and fuel reduction actions in fire-prone forests, than during the period leading up to the NWFP. Members of the amenity coalition who previously espoused "hands off" attitudes about forest management may now be more inclined to acknowledge the role of active management practices in creating desirable ecological conditions. Similarly, there appears to be interest among both the scientific management and amenity coalition affiliates in moving away from the prescriptive, risk averse strategies of the NWFP toward policies that allow more flexibility in light of scientific uncertainties. However, the prominent trend of policy core belief affirmation among commodity affiliates suggests that some members of this stakeholder group may feel disenfranchised from national forest policy. Effort will need to be taken to re-engage this important sector of the policy subsystem, particularly among those who feel disillusioned with the NWFP.

The findings that scientific information does not play a major role in belief change may also have bearing on how advocacy coalitions approach their respective efforts to influence policy change during upcoming forest plan revisions. Arguments based upon the "best available science" may not be enough to convince individuals to reconsider their positions about aspects of forest management. Rather, the findings suggest that attending to unresolved conflict in the policy subsystem may be a productive avenue for influencing learning. Facilitated meetings and

workshops with an eye toward cross-coalition dialogue and understanding should accompany any efforts to present scientific findings. In addition, the findings that experience with policy implementation influences policy core belief change hold promise as well. While it may not be feasible to engage all stakeholders in implementation, there may be novel ways to familiarize a greater range of individuals with the lessons gleaned from policy implementation. For instance, rather than relying on technical experts such as scientists to make arguments as to why policy should change, individuals with proven experience implementing the NWFP over the past two decades may be more effective in pointing out rationale for retaining or revising aspects of the regional policy.

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Appendix A: Interview Guide

Interview Guide *Probe questions will be employed as needed for clarification and elaboration purposes and to prompt discussion of commonly-disputed elements of national forest management policy*	
Introduction	• Introduce purpose of study: I am interviewing yourself and other individuals who were involved with national forest management policy discussions in the Pacific Northwest during the late 1980s and early 1990s. I hope to understand your thinking about the process of forest management planning during the period leading up to the Northwest Forest Plan and what your beliefs are today. • Explain confidentiality measures (transcripts stored on password-protected computer, names, specific affiliation, and details that could identify individual will be omitted from reports, adherence to ethical standards of Human Subjects research) • Ask permission to record and/or take notes during interview. Ask: are you comfortable with me recording this interview? • Remind participant about expected length of interview (45-60 minutes) • Reiterate that the purpose of the interviews are not to reconstruct the events but rather understand your personal beliefs, past and present.
Memory-jogging Warm-up	**1 – To get started, I would like you to think back to national forest policy discussions in the Pacific Northwest during the late 1980s and early 90s. Could you give me a brief description of your role during that time?**
Research question #1 Have stakeholders changed their policy core and secondary beliefs about Pacific Northwest national forest management policy since adoption of the Northwest Forest Plan?	
Open-ended inquiry about beliefs	**2 – In your opinion, what were the major issues affecting the national forests of the Pacific Northwest in the late 1980s and early 90s?**

	Probe, as needed, to elicit more information about specific issues - • *You have described issues related to (…list examples that they mentioned and described). Are there any other issues related to management of Pacific Northwest national forests that were important to you at the time? Please describe or give example….*
Open-ended inquiry about past beliefs	**3 - At the time, what did you think needed to be done to address the issues you have mentioned?** **4 – What was your reaction to the Northwest Forest Plan when it was introduced in 1994?** **4a – Describe or explain how you thought the Plan would address the issues you were concerned about.** *Probe as needed:* • *Refer to issue topics previously discussed with interviewee, as needed, to prompt a response. For example, "Describe how you thought the Plan would/would not address the economic conditions of rural communities."*
Open-ended inquiry about present beliefs	**5 – Now I would like to transition to a discussion of present-day management of Pacific Northwestern national forests. In your opinion, what are the major issues facing Pacific Northwestern national forests today?** *Probe, as needed, to elicit more information about specific issues:* • *You have described issues related to (…list examples that they mentioned and described). Are there any other issues related to management of Pacific Northwest national forests that are important to you? Please describe or give example….*
Research question #2 Have actors changed their core or secondary policy beliefs in light of new scientific or technical information?	
Belief Change	**6 – What have you learned over the past twenty years that's influenced how you think about national forest management?** **6a – Have your views on the issues related to Pacific Northwest national forests changed since the early 1990s? (If yes) How? Can you describe a couple of examples of how your views changed?**

	Alternately, if obvious expression of belief change has already emerged in previous answers: **6b – Why do you think your views on [insert topic/issue] changed? Can you give an example or describe?** *Probe, as needed, to elicit more information:* • *Thinking back to your original ideas about the Northwest Forest Plan, how do you feel about the Plan now that it's been in place for 20 years?* • *Did you learn new information that changed your perspective on the issues related to national forests?* • *Were your beliefs influenced by any particular events or experiences?*
Closing remarks & Snowball sampling	**7 – Is there anything else you would like to mention about your views of the NW Forest Plan?** **8 – Are there any other individuals who were around in the late 1980s or early 1990s who you think I should also talk with?**

Appendix B: Coding Frame

Policy Learning Codes	
Policy Core Beliefs – PC Policy core beliefs relate to one's central beliefs about the process and goals of policy-making within the subsystem (Lubell, 2003), the appropriate scope of participation of the public, experts, and elites in policy decisions, and beliefs regarding the fundamental definitions and drivers of subsystem-wide problems (Matti & Sandstrom, 2011; Sabatier & Jenkins-Smith, 1999).	
Ability for society to solve the problem **PC-Solution**	Expressed beliefs relating to the ability to solve natural resource problems via active management
Ecological Management *PC-Solution-EcoMgt*	Expressed beliefs regarding the ability to advance ecological values through active management
Viability of Scientific Solutions *PC-Solution-Scientific*	Expressed beliefs regarding the viability of scientific solutions to forest management problems
Priority accorded various policy instruments **PC-Instruments**	Expressed belief about the relative effectiveness and importance of policy instruments for forest management
Utility of designations *PC-Instruments-Designation*	Expressed beliefs regarding utility of wilderness and park designations
Secondary beliefs – SB Secondary beliefs regard elements of policy implementation (Lubell, 2003), the severity of problems in specific locations (non-subsystem wide), and beliefs about the performance of specific programs or institutions (Matti & Sandstrom, 2011; Sabatier & Jenkins-Smith, 1999).	
Severity of distinct problems **SB-Severity**	Perceptions that the severity of different aspects of a problem in specific locations has changed
Intensity of wildfire *SB-Severity-Fire*	Perception that dry forests are more threatened by catastrophic wildfires
Overstocked-plantations *SB-Severity-Plantations*	Perception that overgrown plantations have become a resource issue
Lack of early-successional forest *SB-Severity-Early*	Perception that lack of early-successional forest is now a problem
Beliefs regarding causal drivers for specific problems **SB-Causal**	Change in one's belief about the cause of a problem in specific locations
Driver in owl decline SB-Causal-Owl	A revision of former beliefs about the cause for decline in the northern spotted owl
Threats to old-growth *SB-Causal-Old*	A revision of beliefs about the primary threat to old-growth forests

Performance of programs or institutions **SB-Performance**	Beliefs related to the performance of a program or agency involved with forest management.
Performance of Forest Service *SB-Performance-USFS*	Revised beliefs about the performance of the U.S. Forest Service
Policy Learning Influence Codes	
Scientific or technical information **LRN-Science**	Reference to scientific research or technical information such as policy analysis or economic data that the individual either consumed or produced
Conflict resolution **LRN-Conflict**	Reference to consideration of new perspectives after previous threats to core values were resolved
Perception of environmental or social conditions **LRN-Perception**	Reference to perceived changes within the environment, economy, or other social conditions as informing belief change
Direct experience with policy implementation **LRN-Implementation**	Reference to specific involvement with the implementation of forest management policy