

Burning through Boundaries: Collaborative Governance and Wildland Fire Planning in
the United States and New South Wales, Australia

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Dedication

I dedicate this dissertation to my parents, who instilled in me a love of education, an expansive interest in the human condition, and a passion for the natural environment. I also dedicate this work to my husband and best friend Joel Fassbinder, who has unfailingly supported me, grounded me, and loved me through everything.

Abstract

Wildland fire is a complex socio-ecological phenomenon that ‘burns through’ environmental, organizational, and geo-political boundaries. The management of wildland fire has emerged as both a crucial hazard management concern and a critical conservation priority as those living in fire-prone ecosystems experience more severe fire events and altered fire regimes contribute to biodiversity loss. This research examines two policies – the Healthy Forests Restoration Act of 2003 in the United States and the 1997 Rural Fires Act in New South Wales (NSW), Australia – which both seek to enhance inter-organizational coordination and integrated management by mandating collaborative wildland fire planning within legislation. This ‘top-down’ approach is a departure from previous forms of collaborative environmental management that view collaboration as an emergent and voluntary process. Thus, it is unclear whether mandated collaboration fosters the flexible governance, positive social outcomes, and innovative management associated with ‘bottom-up’ collaboration. Taking a multiple case study approach, I explore this question in four chapters, examining, in particular: 1) social learning processes in US collaborative wildland fire planning groups, 2) development of inter-organizational communication networks in NSW bushfire planning groups, 3) processes through which participants in NSW planning groups ‘co-construct’ the fire environment, and 4) modes of governance upon which the US and NSW policies draw and the influence of these governance modes on collaborative processes and outcomes.

Most broadly, I find that wildland fire planning processes and outcomes are dependent on the design of the policy mandate for collaboration, as well as planning context. For example, US wildfire planning groups had to commit to a learning-centered process on the local level, but the design of the policy mandate for collaboration influenced the type of learning that was most likely to occur. Additionally, the legislative mandate for collaboration in NSW fostered the creation of more active inter-organizational communication networks during planning than they had been prior, with important mediating factors such as group size and history of inter-organizational conflict. I also find that the imposition of a standardized planning template led to risk being the primary organizing feature of planning in NSW, promoting the co-construction of a governable fire environment that was not necessarily amenable to achieving broader, landscape-level ecological goals. Though both the NSW and US policies were created with similar goals, each draws upon distinct modes of governance to structure collaboration. The bureaucratic NSW policy focused planning towards strategic outcomes, while the network-based US policy facilitated positive relational outcomes.

This dissertation has implications for collaborative environmental planning theory and practice, begins to evaluate mandated collaboration as a public policy tool, and contributes to international discussions on sustainable wildland fire policy and planning. Policy-mandates create the structural context for multi-stakeholder collaboration, but do not facilitate meaningful collaborative planning processes on their own. Mandates must be met with strong leadership, diverse participation, facilitation, and innovation on the local level. When designing collaborative mandates, policy-makers need to consider the

balance of flexibility and administrative direction within the policy structure. Though bureaucratic directives may promote accountability, standardization, and strategic planning, they may also limit innovation on the local level, place power and influence in the hands of a few organizations, and promote specific (and perhaps narrow) understandings of the environment and the ‘appropriate’ means by which to manage it. Conversely, flexible policy mandates for collaboration may allow for contextual interpretation on the local level and facilitate positive social outcomes, but may also promote limited accountability and be met by a limited set of players with ‘business-as-usual’ approaches to management. However, in a context as dependent on coordination as wildland fire management, mandated collaboration represents a positive public policy innovation by providing a forum for inter-organizational interaction and coordinated planning. Yet, as large fires continue to be a prominent feature of certain landscapes, addressing both hazard reduction and ecological conservation objectives will be a consistent challenge. Policies need to provide substantive guidance *and* procedural direction on how to achieve broader conservation goals within fire management and planning.

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Introduction

Wildland fire is both a potentially life-threatening hazard and a crucial ecological process. In the United States, the number of acres burned yearly by wildland fire has increased steadily since 1980, which has elevated the cost of suppression, damage to homes and structures, and loss of human life (QFR 2009). At the same time, many ecologists and conservationists highlight a critical role for wildland fire in important ecological processes such as promoting biodiversity, facilitating the reproduction of fire-adapted species, and supporting the restoration and maintenance of certain fire-prone ecosystems (e.g. Pyne 1982; Dellasala et al. 2004; Stephens and Ruth 2005). However, the wildland fire issue should not be articulated simply as a ‘humans vs. nature’ conflict. Indeed, many fire scholars argue that human fire-use has influenced the ecological role of fire in many landscapes we think of as being ‘fire-adapted’ (Pyne 1991; Pausas and Keeley 2009; Bowman et al. 2010). Furthermore, one can think of contemporary examples of humans utilizing fire to their advantage, whether it is American farmers burning ditches to control weedy species or Aboriginal Australians using fire to assist in kangaroo hunts. Considering the complexity, conflict, and contradiction inherent to wildland fire systems, managers and policymakers often struggle to balance ecological fire management and fire hazard-mitigation goals (Dellasalla 2004; Steelman and Burke 2007; Gill and Stephens 2009).

If fire is a ‘natural’ phenomenon, what has contributed to bringing wildland fire to its current prominence? The concept of the fire regime – which describes the fuel consumption and fire spread patterns, intensity, severity, frequency, and seasonality of

wildland fire (Bond and Keeley 2005; Bowman et al. 2010) – is central to understanding this question. Fire scientists and policy-makers argue that a suite of social and ecological factors have contributed to altering historic fire regimes in fire-prone ecosystems (Pausas and Keeley 2009). Many cite the expansion of human development within fire-prone ecosystems, also known as the wildland-urban interface (WUI), as a driver of the current wildland fire problem (Dennis-Parks 2004; Radeloff et al. 2005). Wildland fires that occur in the WUI can lead to greater loss of life and infrastructure than those in undeveloped wildland areas. However, wildfire risk in the WUI is also greater due to the increased likelihood of human-ignited fires (Syphard et al. 2007). In the United States, scholars also argue that a legacy of fire suppression has led to the unnatural build-up of ‘fuels’ that has increased the intensity of wildland fires to destructive levels (Stephens and Ruth 2005). Further, ecologists note that non-native plant species may affect natural fire regimes (Brooks et al. 2004; Bond and Keeley 2005). For example, one non-native grass species in Australia has been shown to produce eight-fold increases in fuel loads, contributing to drastic increases in fire intensity (Rossiter et al. 2003). Finally, climate change has been linked to an increase in wildland fire occurrence and severity in fire-prone ecosystems and is predicted to continue to cause changes in fire regimes (Liu et al. 2010). However, these factors – which represent only a subset of wildland fire drivers – are often interdependent, non-linear, and complex in their influence on wildland fire systems.

The public and policy-makers also create narratives to frame, understand, and explain the drivers of wildland fire. For example, Champ et al. (2010) identified three

prominent discourses in Colorado related to humans and wildland fire management: a *protectionist discourse* highlighting the “separation of humans from an authentic nature” valued an unencumbered “let it burn” approach to wildfire; a *humanist discourse* valuing the protection of human-life; and an *organic discourse*, underscoring the importance of human responsibility for managing hazards while living in at-risk areas. Similarly, an Australian study found that people varied in how they attributed responsibility and blame for wildland fire events. A *conservation discourse* viewed fire as a natural and inevitable event; a *ruralist discourse* framed bushfire as unnatural and attributed fires to what they saw as a lack of active management by public land agencies; and a *wise use discourse* argued that environmentalists and environmental regulations were to blame for bushfires (Whittaker and Mercer 2004). Thus, the discussions surrounding wildland fire echo some of the most challenging and pervasive debates within conservation biology: development and conservation, active management and protectionism, valuing human and non-human life/well-being, and weighing economic concerns and ecosystem functions.

At the core of the wildland fire issue, however, is the question of how to best create policies and institutions to reduce the risk of wildland fire to lives, property, and the environment, while also restoring and maintaining the ecological role of wildland fire in fire-prone landscapes. Much of US wildland fire policy in the 20th century utilized a suppression-based approach designed to largely eliminate fire on the landscape. However, scholars have deemed such command-and-control models as “policy failures” (Busenberg 2004) and have called for more integrated and cooperative approaches to wildland fire management (Dombeck et al. 2004; Steelman and Burke 2007). Though

recent policies have begun to reflect this change and research on social aspects of wildland fire management has been expanding (e.g. Nelson et al. 2004, 2005; Jakes 2007; Jakes et al. 2007; Grayzeck-Souter et al. 2009; Brummel et al. 2010; Jakes et al. 2011), there are calls to continue to evaluate our wildland fire policies and institutions, particularly as they relate to management on the local level (Field and Jensen 2005; Steelman and Burke 2007). Thus, I approach the issue of wildland fire management from an institutional point-of-view, focusing in particular on the influence of legislation on local and regional fire management and socio-organizational relationships. However, my inquiry is also grounded in an ecological understanding of the role of wildland fire in the landscape.

Much of the complexity associated with wildland fire management and policy is rooted in the fact that *wildland fire burns through boundaries*. Wildland fire does not heed property lines. One particular wildland fire can pass through federally-managed forests, state-managed timber land, county-managed conservation reserves, and privately-owned farms, forests, and homesteads. Wildland fire management also occurs in complex organizational landscapes. In a single county in the Minnesota, for example, the US Forest Service, the Minnesota Department of Natural Resources, County Land Management, the County Sheriff, several local fire and police departments, and private land-managing organizations such as timber companies, will all have a stake in and responsibility for wildland fire management and planning. Because wildland fire is a trans-boundary phenomenon, policy-makers in the US and Australia have abandoned more traditional, single-agency approaches to fire management for collaborative, locally-

driven models (Grayzeck et al. 2009; Nelson et al. 2004; Handmer 2003; Brummel et al. 2010; Jakes et al. 2011).

In this dissertation, I examine two examples of coordinated management in the context of policy-mandated collaborative wildland fire planning: (1) Community Wildfire Protection Planning (CWPPs) under the US Healthy Forests Restoration Act of 2003, and (2) Bush Fire Risk Management Planning (BFRMPs) under the 1997 Rural Fires Act in the Australian state of New South Wales. As two largely developed regions with expanding wildland-urban interface areas and diverse fire-prone landscapes, the United States and New South Wales (NSW) face similar wildland fire management challenges. Policy-makers in both governments have responded to the trans-boundary complexity presented by wildland fire by mandating collaborative wildland fire planning within legislation. However, legislatively-mandated collaboration represents a shift from traditional views that define collaboration as an “emergent” and “voluntary” undertaking (Gray 1989). In mandated collaboration, legislation sets the framework for interaction amongst participating stakeholders. Thus, it is unclear whether mandated collaboration will produce some of the benefits – such as social learning, improved relationships, integrated understanding of the environmental system at hand, and meeting multiple stakeholder interests – which are put forth by collaboration scholars (see Gray 1989, Innes and Booher 1999, Wondolleck and Yaffee 2000, Bentrup 2001, Daniels and Walker 2001, Margerum 2002). Moreover, each of the mandating-legislations I examine use different strategies to foster collaboration on local and regional levels, calling into question *which* approaches more successfully facilitate collaborative wildland fire

planning. Thus, the over-arching objective of this dissertation is to examine the influence of mandated collaboration on wildland fire planning processes and outcomes.

I use the concept of boundaries as an organizing conceptual and analytical principle in my examination of policy-mandated collaborative wildland fire planning. Indeed, the notion of boundaries is pervasive in wildland fire systems. Through mandating collaboration, for example, policy attempts to make boundaries between organizations more permeable to facilitate coordination across ownership boundaries on the landscape. Wildland fire planners also create physical boundaries on the landscape in the form of fuel breaks in attempts to control wildland fire and to protect particular values or assets. Additionally, collaborative participants often perceive social boundaries between stakeholders in terms of their interests, objectives, and motives for participation. Finally, wildland fire systems challenge our notions of symbolic boundaries between the ‘natural’ and ‘social’ environment. Lamont and Molnar (2002) argue that “...focusing on boundaries themselves may generate new theoretical insights about a whole range of general social processes...” (p. 168). Others highlight that we create boundaries to order, understand, simplify, and even control social and natural systems (Ashforth, et al. 2000; Li et al. 2000; Folke et al. 2005). Thus, boundaries allow us to separate groups of people, systems, ideas, and the environment in a way that facilitates a sense of control within that boundary and an asymmetry of power across that boundary. In a complex world, however, the creation of boundaries may be crucial in creating efficiencies, clarifying goals, formalizing approaches, and facilitating joint action. Investigating these ‘burning boundaries’ will aid my multi-level examination of policy-mandated collaborative

wildland fire planning in the US and NSW, Australia. Below I present an overview of the dissertation according to the boundary-level concepts that structure each chapter.

Chapter 1: Collaborative wildland fire planning is a multi-faceted, multi-stakeholder undertaking in which parties represent diverse planning objectives such as the protection of human life and property, fire suppression, fuels management, ecological conservation, and public education. However, wildland fire planning participants often view these planning objectives and the stakeholders who represent them as separate, if not incompatible. In chapter 1, I examine whether and how CWPP groups in the US *overcome social boundaries amongst stakeholders through social learning processes.*

Chapter 2: The traditional notion of an organization is a boundary-reinforcing social entity with largely independent interests (Martin et al. 1983). Collaborative planning seeks to foster relationships across organizational boundaries to facilitate communication, enhance coordination, and potentially lead to inter-organizational innovation in fire management. In chapter 2, I investigate *the creation of communication relationships across organizational boundaries* in BFRMP groups in New South Wales.

Chapter 3: Wildland fire is an interdependent and intertwined socio-natural system. In this chapter, I pull from co-constructionist theory (Irwin 2001; Murdoch 2001; Hannigan, 2006) to examine how BFRMP groups in New South Wales co-construct the natural and social fire planning environment during

collaborative planning. In particular, I explore *how planning groups construct boundaries between the social and natural*, as well as *how they place boundaries on the landscape to order, categorize, and manage the fire environment*.

Chapter 4: Traditional grassroots collaborations largely rely on network modes of governance – characterized by social interaction and the identification of common interests – to structure collaborative forums (Lowndes and Skelcher 1998). However, policies that mandate collaboration must draw upon additional modes of governance such as bureaucratic and incentive modes of governance to encourage and sometimes enforce participation by diverse stakeholders (Lowndes and Skelcher 1998; Rodriguez et al. 2007). In chapter 4, I compare how the US Healthy Forests Restoration Act and the NSW Rural Fires Act *use various governance modes to draw boundaries within policy to structure collaborative wildland fire planning processes*.

Thus with research, I examine the concept of boundaries on multiple scales: boundaries in group-level interaction and planning, boundaries in inter-organizational social networks, boundaries within the fire environment, and boundaries within policy.

Though wildland fire is not exclusively a conservation biology problem, conservation biologists have taken note of its importance to broader conservation agendas: The Nature Conservancy has highlighted sustainable wildland fire management as a one of its top seven conservation priorities (TNC 2010) and a 2004 volume of

Conservation Biology underscored concerns about fire management and fuel management as relating to conservation (Williams and Dellasala 2004). As discussed above, the wildland fire issue encapsulates many of the most challenging discussions in conservation biology, such as balancing human well-being and conservation objectives, prioritizing conservation and development, and debating active management and protectionist models of fire management. Since these debates are intertwined with wildland fire management, my research will also speak towards these broader conservation conversations.

This dissertation also contributes to theoretical and practice-based literatures in public policy, environmental planning, wildland fire management, and environmental sociology, all of which are important threads within conservation biology. Further, since collaborative wildland fire planning is a multi-objective undertaking, it is also consistent with conservation biology's foundational principles of multi-disciplinarity and incorporating ecological and social objectives in decision-making (Groom et al. 2006). Though there is a rich existing literature on collaboration, each of these chapters contributes to the evaluation of policy-mandates as tool to promote local and regional collaboration. In drawing from social learning theory, I am able to speak to the influence of policy-mandated collaboration on group-level relational dynamics, decision-making, and collective action. My work on social network analysis contributes to understanding on the dynamics of inter-organizational communication within policy-mandated collaboration. My chapter exploring co-construction of the fire environment within collaborative planning groups highlights challenges associated with addressing

conservation and hazard mitigation goals in wildland fire planning. Using governance theory, my final chapter takes an international policy comparative approach to expanding understanding of the influence of policy mandate design and governance mode on collaborative planning forums. By giving explicit attention to these topics in the following chapters, I hope to further to discussion within the conservation biology community *and* contribute to public policy, environmental planning, and wildland fire management theory and practice.

Chapter 1 - Social Learning in a Policy-Mandated Collaboration: Community Wildfire Protection Planning in the Eastern United States

Introduction

Collaboration and Social Learning

Collaboration has emerged as a popular means to address complex environmental planning problems (Healey 1992; Ascher 2001). It is described as “a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible” (Gray 1989, p.5). Early theorists viewed collaboration as one of the most participant-intensive in the range of participatory planning approaches, with expectations for extended stakeholder engagement and multiple opportunities for influence (Arnstein 1969). More recent scholars have found that this multi-stakeholder planning can diminish conflict, lead to creative decisions, and facilitate integration of diverse interests in a single plan (Gray 1989; Wondolleck and Yaffee 2000; Margerum 2001). In the United States, policy-makers have embraced integrative approaches by mandating collaboration within some environmental planning legislation. However, requiring collaboration within policy is a significant shift from the grassroots projects that popularized collaborative approaches. In fact, some assert that collaboration is emergent and voluntary by definition (Gray 1989). In the policy-mandated form, legislation is an external impetus for collaboration and policy sets the framework within which social interaction occurs. Catalyzing collaboration from the top-down can be problematic: planning groups may be short-lived and the impacts of planning may be minimal due to the lack of local-

ownership and/or local-relevance (Taylor and Schweitzer 2005; Genskow 2009). Thus some question whether mandated collaboration will encourage effective planning in the same way as more organically-initiated collaborations (Rodriguez et al. 2007)

Regardless of the impetus – policy-mandated or emergent – planning research highlights social learning as integral to collaborative success (Schusler et al. 2003; Bouwen and Taillieu 2004; Pahl-Wostl and Hare 2004; Deyle and Slotterback 2009). However, some have argued that “learning cannot be legislated or prescribed” (Bull et al. 2008, p. 712). Since most agree learning is integral to creating positive collaborative outcomes, we use evidence of social learning to examine policy-mandated collaboration. Social learning is understood as “...learning that occurs when people engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action” (Schusler et al. 2003, p. 311). A common thread within social learning theory is that groups of stakeholders are able to *transform* their perspectives, understanding, and behavior through learning in collaborative contexts. Through “transformative learning”, people may find more integrated, sustainable solutions to difficult environmental problems (Sims and Sinclair 2008). Thus transformative learning theory (Mezirow 1991 1994) provides an appropriate framework to investigate distinct social learning processes and outcomes that may occur in collaborative contexts.

Mezirow (1991, 1994) highlights both instrumental and communicative capacities as crucial to fostering transformative learning by changing participants’ frames of reference towards being more inclusive, integrative, and innovative. Instrumental

learning involves gaining new skills and information related to the substance of an issue (Mezirow 1994; Bull et al. 2008; Sims and Sinclair 2008). Through interacting with new data, conducting joint fact finding, or engaging with knowledge “gatekeepers”, participants can construct new cause-effect relationships (Mezirow 1994; Petts 2007; Sims and Sinclair 2008). Communicative learning involves learning about values and intentions, learning how to work together, and building common identity (Mezirow 1994; Petts 2007). By way of dialogue and discourse, communicative learning gives people a better understanding of others’ points of view and important normative concepts (Sims and Sinclair 2008). Supported by transformative learning, collaborators seek “... solutions that go beyond [one’s] own limited vision of what is possible” (Gray 1989, p. 5). So like others (Petts 2007; Bull et al. 2008; Sims and Sinclair 2008), this research explores social learning in participatory environmental planning through investigating transformative, instrumental, and communicative learning

Despite improving conceptual specification, scholars have called for additional empirical work on social learning in environmental planning contexts (Muro and Jeffrey 2008). This research examines social learning in multiple case studies of policy-mandated collaboration in wildfire management groups in the eastern United States, a region under-represented in wildfire studies. A multiple-case study design makes it possible to draw conclusions across cases, as well as distinctions between contexts. Though some have questioned whether promoting social learning is always worthwhile (Mostert et al. 2007), the trans-boundary, multi-objective nature of wildfire planning makes coordination and learning necessary (Dombeck et al. 2004). This research examines collaborative planning

in a new context and delivers on calls for additional study of communities and institutions in wildfire management (Field and Jensen 2005). Finally, I investigate the capacity of federal policy-mandated collaboration – a relatively unexamined innovation in public policy – to encourage learning-centered planning on the local level.

Twentieth-century US wildfire policy has been critiqued as being based on an ineffective and expensive fire suppression approach (Busenberg 2004). More recently, US wildfire policy has moved towards integrative planning approaches that include hazardous fuels reduction, forest restoration, and community partnerships (Jakes et al. 2003; Nelson et al. 2005; Sturtevant et al. 2005; Steelman and Burke 2007). One such policy – the Healthy Forests Restoration Act (HFRA) of 2003 – encourages local wildfire management planning through Community Wildfire Protection Plans (CWPPs). A CWPP is necessary for a community to receive federal funds through HFRA (Stelman and Burke 2007) and some states require a community to complete a CWPP to receive any state-distributed federal fire funding. Furthermore, HFRA mandates that CWPPs must be produced collaboratively. Legislation requires three entities – the local fire chief, the state forester, and another relevant local official – to sign off on the CWPP for it to be considered valid collaboration. Additionally, most CWPPs are prepared with participation from federal land management agencies. HFRA requires a CWPP group to “identif[y] and prioritiz[e] areas for hazardous fuel reduction treatments and recommen[d] the types and methods of treatment...and recommen[d] measures to reduce structural ignitability throughout the at-risk community” (HFRA 2003). Transformative learning is particularly salient in this context since HFRA brings together participants

with diverse perspectives on fire suppression, hazard reduction, emergency management, and forest restoration. If transformation of wildfire planning approaches is necessary to improve management (Dombeck et al. 2004; Steelman and Burke 2007) and social learning is central to fostering collective action (Schusler et al. 2003; Pahl-Wostl and Hare 2004), the question remains whether policy-mandated collaboration can encourage learning, transformation, and joint action amongst planning partners. This research examines three case studies of CWPPs, asking:

- (1) Do both instrumental and communicative social learning emerge from policy-mandated collaborations? Furthermore, do CWPP groups demonstrate evidence of transformative learning?
- (2) Do planning groups come to a shared understanding of wildfire through collaboration? If so, what are the characteristics of shared understandings?
- (3) Does the planning outcome – the wildfire plan – reflect these shared understandings?

Specifying the Social Learning Concept

As the research model, I adapted Muro and Jeffrey's (2008) compound social learning model synthesized from the participatory environmental planning literature (Figure 1). In this adapted model, policy sets the context by requiring interpersonal interaction among stakeholders, thus enabling social learning among interdependent participants. Particular collaborative context and process features – such as facilitation and diverse stakeholder participation – may foster social learning. Through social

learning, participants may realize individual learning outcomes such as new skills. However, most relevant to collaborative planning, social learning can lead to collective learning outcomes such as shared understanding and mutual agreement. The model's conceptual links between learning context, process, outcome, and collective action inform my research questions and methodology.

The transformative learning framework is embedded within Muro and Jeffrey's model to structure the examination of social learning (Figure 1). Within this model, transformative learning "is learning that transforms problematic frames of reference—sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) – to make them more inclusive, discriminating, open, reflective, and emotionally able to change" (Mezirow 2003, p.58). Building instrumental and communicative capacities is crucial for transformation (Figure 1). In collaborative wildfire planning, transformative learning could occur when participants critically reflect upon their current management system, changing their perspective and identifying ways to accommodate that new perspective.

Several learning theories – such as experiential learning (Kolb 1984) and organizational learning (Argyris and Schön 1978) – have contributed to understanding social learning in participatory environmental planning contexts. I utilize the transformative learning framework to provide theoretical focus to this decidedly empirical research, while building on related studies that have done the same (e.g. Petts 2007; Bull et al. 2008; Sims and Sinclair 2008). Further, transformative learning theory provides a structure to characterize specific types learning processes and outcomes. This

explicit approach is particularly important as practitioners, facilitators, and policy-makers seek to design policy and planning processes to achieve specific learning outcomes.

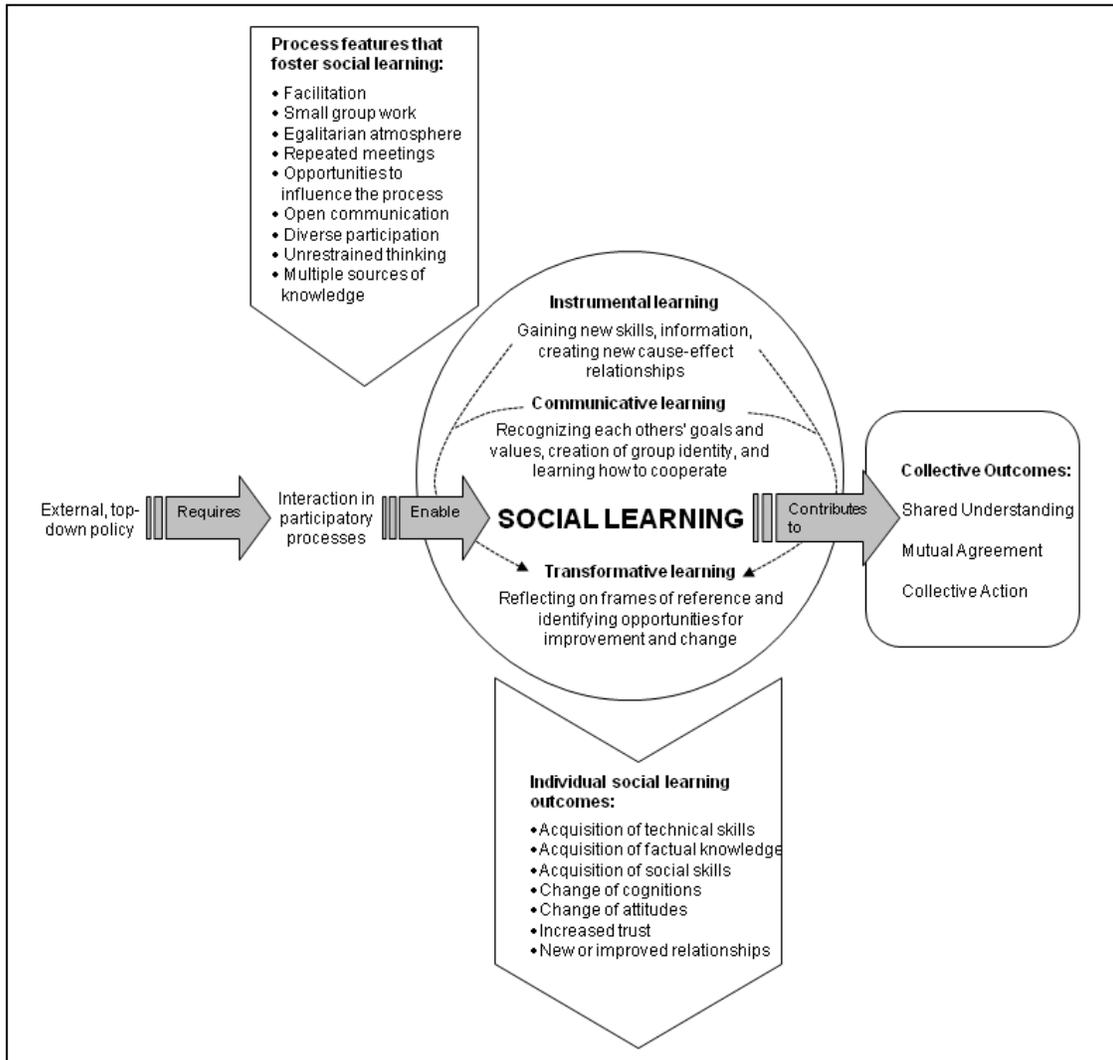


Figure 1. A conceptual model of social learning in collaborative environmental planning contexts modified from Muro and Jeffrey (2008).

The adapted model also highlights shared understanding as a crucial outcome of social learning (Figure 1). Individual understanding may change through social learning,

but in collaborative contexts it is important that individual understandings align across participants to form shared understanding (Schusler et al. 2003). For example, social learning *could* reaffirm to stakeholders that their individual interests conflict in ways they view as irreconcilable (Leeuwis 2000), thus impeding collective action. But shared understanding is the belief that other members of the collaborative group hold a similar understanding. Therefore, I treat shared understanding as distinct from individual social learning outcomes to evaluate the capacity of mandated collaboration to foster collective action.

Methods

Data Collection and Analysis

Between June 2006 and February 2007, I investigated three CWPP groups in the eastern United States: Lake County, Minnesota (MN), Barnes-Drummond, Wisconsin (WI), and Taylor, Florida (FL) (Table 1). To identify these cases, I made contact with key informants in state and federal forestry agencies and selected groups that varied in ecological context and planning scale. The selection was limited to groups that had finished planning by the time of study, but it was possible to interview all participants within six months or less of CWPP completion.

I conducted a total of 36 semi-structured interviews with ‘primary’ participants from the three case study locations. ‘Primary’ participants were those actively involved with planning, operationally defined as attending three or more meetings. At each case study location, I spoke with planning representatives from the USDA Forest Service (USFS), the relevant state forestry agency, county land management, county emergency

management, municipal government, and local fire departments. Ultimately, I interviewed an average of 85% of primary participants across cases. The interview guide was structured to examine CWPP context, process, and outcomes (Appendix 1). Consistent with literature that informs the model in Figure 1, I designed the social learning interview questions to understand process factors, individual learning outcomes, and collective learning outcomes. Measuring social learning can be challenging since researchers generally rely on participants' self-assessment of learning and change. However, in-depth, qualitative retrospective interviews are used widely within the social learning and participatory planning literature for this purpose (e.g. Schusler et al. 2003; Bull et al. 2008; Sims and Sinclair 2008). Mezirow (2003) in particular notes the suitability of qualitative approaches to investigating transformative learning. Interviews ranged between 25 minutes to 2 hours; all were digitally-recorded and transcribed verbatim.

I analyzed interviews for social learning-related themes, coding for evidence of instrumental, communicative, or transformative learning based on definitions from the literature (Mezirow 1991, 1994, 2003). Previous studies on transformative learning in participatory environmental management contexts have taken a similar analytical approach (Petts 2007; Bull et al. 2008; Sims and Sinclair 2008). For instrumental learning, I coded when participants specifically noted *new* substantive knowledge or skills resulting from the planning process. I identified communicative learning when participants noted improved understanding of others' values, priorities, and intentions, when they indicated new knowledge of how to cooperate, or when they described

Table 1. Summary of collaborative context and process in three case studies of Community Wildfire Protection Planning.

Process factors	Lake County, Minnesota	Barnes-Drummond, Wisconsin	Taylor, Florida
<i>CWPP group size^a</i>	20	18	9
<i>Primary representation (number of representatives)</i>	US Forest Service (8) MN Department of Natural Resources (4) Lake County Government (4) Volunteer Fire Departments (4)	US Forest Service (5) WI Department of Natural Resources (4) Town Boards (4) Bayfield County Government (3) Volunteer Fire Departments (2)	US Forest Service (2) Florida Department of Forestry (2) Baker County Government (2) Baker County Fire Department (1) Town Representative (2)
<i>Non-agency representation^b</i>	Volunteer Fire Departments	Volunteer Fire Departments Town Board Members	Town Pastor
<i>Duration of process</i>	16 months	8 months	3.5 months
<i>Number of meetings</i>	18	8	4
<i>Size of planning area</i>	1.34 million acres	171,056 acres	1,700 acres
<i>Definition of planning area</i>	Prior to planning, in a pattern of county-scale plans on the state level.	Defined collaboratively by the planning group	Defined by the planning group

^aGroup size is reported on those who attended at least one-third of planning meetings and/or were identified by facilitators as primary participants.

^bI report only those non-agency representatives that were primary participants.

developing shared identity. Finally, I coded for transformative learning when interviewees noted reflection, identified opportunities for improvement in the wildfire management status quo, indicated a new way to address that issue, and discussed how that change might affect the wildfire management system. I coded learning categories as mutually exclusive so that no one mention of learning could be coded as more than one learning type.

Additionally, I evaluated whether participants described a shared understanding of the wildfire problem based on the planning process and I assessed the characteristics of their description. I defined understanding as ‘shared’ when the participant reported a learning outcome, indicated that others in the planning group shared this understanding, and when that understanding was reported consistently across interviewees. One researcher conducted the first analysis and coding was verified by a second researcher. Finally, I reviewed planning documents from each CWPP group, examining proposed actions and evaluating whether these actions reflected participant-reported shared understandings.

Case Studies

Lake County, Minnesota

Lake County is in rural northeast Minnesota in the US Midwest. The county is bound by Canada on the north and Lake Superior on the south, with most of the 11,000 residents concentrated in small towns near the lakeshore. Seventy-eight percent of the 1.34 million acres of Lake County are publicly owned and 90% of the county is forested with northern hardwood, pine, and boreal forest types. Fire occurrence is cyclical with

droughts, and wind-felled trees from a 1999 blow-down event continue to be a management concern.

This CWPP was initiated by USFS representatives from the Superior National Forest, with a strong local partnership from the County Commissioners' office. Additional participants represented government organizations, including eight volunteer fire departments, the Minnesota Department of Natural Resources (DNR), Lake County Forestry, and Lake County Emergency Management. The CWPP was facilitated by the partnership coordinator from the Superior National Forest and a fire planner from the Minnesota Interagency Fire Center.

Barnes-Drummond, Wisconsin

Barnes and Drummond – population 610 and 541, respectively – are two adjacent communities in northwest Wisconsin. Drummond is a gateway community to the Chequamegon-Nicolet National Forest and is surrounded by mixed hardwood forests. The forests surrounding the town of Barnes are populated by jack pine and red pine stands, most of which is under county management or is industrially-owned.

This CWPP was initiated locally through discussions between the USFS District Ranger and the DNR Area Forester. Simultaneously, Wisconsin's central DNR office was considering introducing CWPPs into the state, so Barnes-Drummond became the pilot CWPP for Wisconsin. The group hired a professional planner/facilitator from the Wisconsin Northwest Regional Planning Commission, a quasi-governmental organization that contracts with local government. The planning area included the towns as well as surrounding federal, county, private, and industrial forest land. The CWPP was

completed with partnership from the USFS, Wisconsin DNR, Bayfield County Forestry, County Emergency Management, as well as representatives from the town boards and volunteer fire departments.

Taylor, Florida

Taylor is a small, unincorporated community surrounded by federal, state, and private industrial forest in north-central Florida. Baker County estimates the Taylor area houses approximately 1,500 residents and contains 425 building structures, such as private homes. The primary forest type is longleaf pine or cultivated slash-pine, both of which pose a high fire risk. In the past 10 years, four major fires have threatened Taylor, though there has been no major structural damage.

In response to HFRA, the Florida Department of Forestry initiated the Taylor CWPP in collaboration with representatives from the Osceola National Forest, Baker County Fire & Emergency Management, and a forester from an adjacent industrial forest. Planning was heavily agency-driven, but the core group later brought in a Taylor pastor and the volunteer fire chief to act as community liaisons.

Results

This study of policy-mandated collaboration examined 1) the emergence of social learning from planning groups, 2) the development of shared understanding amongst participants, and 3) whether shared understanding is reflected in wildfire plans. Although the three groups investigated operated under the same political mandate for collaborative wildfire planning, process factors (duration of planning, number of participants, scale of

planning area, and number of meetings) varied quite widely (Table 1). The Lake County, MN and Barnes-Drummond, WI CWPP groups demonstrated evidence of social learning and developed a shared understanding through collaborative planning. However, participants in Taylor, FL indicated that they entered the CWPP process with a pre-existing shared understanding of wildfire management and that social learning was not a strong aspect of the planning process (Table 2). Below I organize findings around the three research areas.

Table 2. Evidence of learning types in case studies of Community Wildfire Protection Planning. I report 1) the number of individuals showing evidence of each learning type, and 2) percent of total interviewees from each case study showing evidence of each learning type to enable comparison across cases.

Case (# participants)	Instrumental learning Freq. (%)	Communicative learning Freq. (%)	Transformative learning Freq. (%)
<i>Lake County, Minnesota</i> (n = 15)	4 (27%)	12 (80%)	7 (47%)
<i>Barnes-Drummond, Wisconsin</i> (n = 12)	1 (8%)	9 (75%)	2 (17%)
<i>Taylor, Florida</i> (n = 9)	3 (33%)	1 (11%)	0

The Emergence of Social Learning

Instrumental Learning

CWPP participants generally did not gain new knowledge or skills related to wildfire management through instrumental learning. Less than a third of participants in

each case study provided examples of instrumental learning (Table 2) and all of these examples were from non-land management representatives. In Florida, where little learning occurred, instrumental learning was the most frequently reported learning type:

“I think the participation we had up [in Taylor] brought light to [the community]. I think they have a better picture of what the possibilities are and what steps we are trying to do to mitigate [the wildfire risk].” (Taylor, FL)

In all cases, the few examples of instrumental learning were either self-reported by community representatives or were observed by agency employees and attributed to community representatives.

Communicative Learning

Communicative learning in CWPP groups involved learning about other parties’ management interests and priorities and navigating group values to address the wildfire problem. In the Wisconsin and Minnesota CWPP groups, participants put forth examples of communicative learning most frequently (Table 2). Over three-quarters of the participants in both groups reported at least one example of communicative learning. This was true across participants’ organizational sectors – federal, state, and local.

“I guess everybody understands where everybody else is. You know, where they’re coming from more now...and understand a little more how we can help each other too.” (Lake County, MN)

“The one thing I have learned a lot about is that relationship...how the agencies play together, the politics of this sort of thing.” (Barnes-Drummond, WI)

Participants attributed communicative learning to engaging in a collaborative risk assessment where they scored and ranked community values (such as infrastructure values and ecological values) and determined relative risk in sub-planning areas:

“When we really started doing hazards and risks...there was a lot of discussion on just what high, low, medium hazards were. It went on and people talked about the areas and...as people spoke more, they got to know which [participants] know which areas better.” (Lake County, MN)

Planning stakeholders also highlighted the importance of open discussion in enhancing communicative learning. In particular, interviewees noted the importance of facilitation:

“Well, I think having [name] in the role of facilitator [helped]...And, it’s important that the facilitator come from the outside, without biases or opinions...You know, basically they just know how to keep everybody on track, and that in itself was a big help.” (Barnes-Drummond, WI)

Communicative learning did not emerge strongly from the Taylor planning process.

Transformative Learning

Transformative learning did not appear strongly across the three CWPP case study groups (Table 2). However, nearly half of the people we talked to in Lake County, MN noted at least one example of transformative learning arising from their planning process. In particular, participants broadened their view about what fire management could be in their region. This group redefined fire management as something that can happen outside federal land:

“And [the highest priority region] doesn’t have a stitch of National Forest land, which I think is really cool. This is truly the idea of the Community Wildfire Protection Plan to work out in those areas. You don’t always have to have a National Forest component or BLM component; it’s all of us working together as a community.” (Lake County, MN)

CWPP participants also identified opportunities to transform organizational coordination through the creation of a new position in the county:

“I think that there will be a county coordinator [for the] fire department[s] that will happen and would not have happened for a lot longer if it hadn’t been for [the CWPP process]. It focused the county’s attention on [the] need of the fire departments. They had heard a little bit of it here and there but [after the CWPP process] it was really unified.” (Lake County, MN)

Lake County CWPP participants even altered their view of how to conduct business within their home organizations. For example, this agency representative developed a new view of how to work across departmental boundaries:

“I know within our agency, I perceived there to be a disconnect between different entities, like wildlife, and timber, and fire, and vegetation management. And now I think a lot folks within our agency are starting to think about “wow” maybe we should be working more together on some of our projects to make them all-encompassing.” (Lake County, MN)

Neither Barnes-Drummond nor Taylor participants highlighted many examples of transformative learning as emerging from the CWPP process.

Shared Understanding in Collaborative Planning

Changes in Shared Understanding

Every participant interviewed indicated that their CWPP group had a shared understanding of the wildfire problem in their area. However, only participants in Lake County, MN and Barnes-Drummond, WI attributed that shared understanding to the CWPP process. Participants from Taylor, FL indicated that they came into the CWPP process with a pre-existing shared understanding of the wildfire problem in their area due to a history of wildfire occurrence across the mosaic of landownership:

“I think [the shared understanding] was probably already there because we’ve had so much experience in the past with [wildfire].” (Taylor, FL)

However, Taylor participants did note strengthening of their previous understanding, along with a new commitment to work with Taylor residents.

In Lake County, approximately three-quarters of participants indicated that the group came to a shared understanding of wildfire in their region as a result of the CWPP process. The remaining participants – four USFS representatives – believed the group had shared understanding prior to the CWPP process. In Barnes-Drummond, the vast majority of participants linked the development of their shared understanding to learning that occurred during the collaborative planning process.

Components of Shared Understanding

Shared understanding was comprised of two components in Lake County and Barnes-Drummond: substantive and relational understanding (Table 3). Substantive

understanding influenced *what* issues the group addresses and the collective reasoning of *why* they chose to address them. Relational understanding influenced *how* the group acted to address those substantive issues.

Elements of Substantive Understanding: Planning participants in Lake County and Barnes-Drummond noted that the CWPP process allowed the group to collectively identify wildfire as a problem worth addressing in their region (Table 3).

“I think that the fire departments had a basic understanding of the concern, because there’s ongoing education about that. I don’t know that that was true for elected officials. I think we came to the same page kind of understanding [through the process].” (Barnes-Drummond, WI)

CWPP members also came to collective agreement about the nature of wildfire hazards on the landscape and agreed that hazards needed to be mitigated through management action. Participants highlighted the importance of the policy in instigating collective action:

“I think everybody understood that [wildfire] was [a] concern because the fuels were there...every year that went by got drier and drier, and that stuff’s just laying around. Everybody was concerned about it, but until [the CWPP] came about, nobody did much about it.” (Barnes-Drummond, WI)

Further, participants learned about each others’ values and jointly assigned priority to wildfire management goals:

“Yeah, life, homes, property...that’s what our part of the whole big picture is...in that order, lives, homes, property and resources. I mean, that’s everybody’s priority.” (Lake County, MN)

Finally, each CWPP group jointly identified the course of action they would take to mitigate wildland fire hazards (Table 3).

Elements of Relational Understanding: Participants in Lake County, MN and Barnes-Drummond, WI reported greater understanding of organizational roles, capabilities, and policies surrounding wildfire management.

“I think we got a better understanding of each other’s capabilities, I think [that] was one of the biggest things... I think just the discussions around the table mostly [helped us understand that].” (Lake County, MN).

“I think that in Lake County [the CWPP] really helped the partners come together and understand what everybody’s role is as a whole. Looking at the big picture... because everybody was just working on their own before.” (Lake County, MN)

Thus, through gaining better knowledge of other organizations, participants created a system-level understanding of organizational interdependence in wildfire management. From that, participants created the understanding that inter-agency collaboration is important to wildfire management.

“I think people realize how important it is to communicate what your projects are and ...work together to solve a problem rather than work separately.” (Lake County, MN)

In Taylor, participants stressed that the process did reconfirm the importance of cross-organizational relationships, but that this understanding was not new.

Table 3. Evidence of substantive and relational understanding developed during the community wildfire protection planning (CWPP) process based on interviews and CWPP documents, for Lake County, Minnesota and Barnes-Drummond, Wisconsin.

Components of shared understanding	Evidence of substantive and relational understanding			
	LAKE COUNTY, MINNESOTA		BARNES-DRUMMOND, WISCONSIN	
<i>Substantive understanding</i>	<i>Interviews</i>	<i>Planning document</i>	<i>Interviews</i>	<i>Planning document</i>
<i>Problem identification</i>	“I think they do have a realization that there is a problem out there.”	“The threats to life and property, the assets lost, and the cost for fighting fires are continuously escalating.”	“I think everybody pretty much realized we have problems there, or potential problems.”	“Residents and local community leaders have become increasingly aware of the tangible wildfire threat facing their communities.”
<i>Cause/Hazard identification</i>	Hazardous fuel build-up	Proposed actions to mitigate hazardous fuels	Fuels build-up, debris burning	Proposed fuel mitigation, regulation on burning permits to residents
<i>Management approach</i>	Protect “...life, homes, property, then the resource”.	Infrastructural values rated higher than ecological values; priority actions in higher populated areas	Focus on highest risk areas, where housing and forest fuels meet	Proposed actions directed towards high-risk housing developments
<i>Relational understanding</i>	<i>Interviews</i>	<i>Planning document</i>	<i>Interviews</i>	<i>Planning document</i>
<i>Agency roles, policy, capabilities</i>	“Everybody’s probably got a better understanding of who the players are, and what they do, maybe.”	Includes a list of policies and statues that direct relevant land management agencies.	“Greater understanding of...general operating... Different policies, different ways of doing things legally.”	Includes lists of agency resources, current projects, and identifies land management responsibilities.
<i>Inter-agency collaboration</i>	“We got talking [about] working together to get the agencies working more closely together.”	“Implementation of the Lake County CWPP will continue as a collaborative effort.”	“...cooperation was needed from all the government units in order for it to be a success.”	Implementation is assigned to individual agencies. Limited mention of future collaboration.

For those participants that attributed the creation of shared understanding to the CWPP process, both the policy and local leadership acted as catalysts for collective action on the local level:

“Everybody was concerned about [wildfire], but until [the CWPP] came about, nobody did much about it. Somebody had to get the ball rolling, I think.” (Barnes-Drummond, WI)

“Well, it was one of those deals where it’s about time we do something. I’m glad somebody brought us together.” (Barnes-Drummond, WI)

However, in discussing shared understanding, some participants indicated that the primary motivation to complete a CWPP was to increase access to federal funding:

“Cut to the quick: it’s money. To help this community and to help ourselves...So I think that’s what [the CWPP] looked like, something we needed to do, so we can do something better in the future.”
(Barnes-Drummond, WI)

“You’re viewing this as there’s this carrot out there, called money... and if we get this done, well that’ll make us that much more in-line for getting some homeland security money and so on and [this CWPP] shows how interested we are in cooperatively working with everybody.”
(Lake County, MN)

So funding was viewed as a vehicle to community service and improved local resources for wildfire management.

From Shared Understanding to Proposed Action

I reviewed CWPP planning documents to determine whether participant-reported shared understandings were evident in proposed actions. I found evidence of each

component of interviewee-identified shared understanding in both planning documents that I reviewed (Table 3). However, proposed actions were often outside of shared understandings reported in participant interviews. I did not include a review of the Taylor document as the group did not develop their shared understanding within the CWPP process.

Lake County, Minnesota CWPP

The primary decision-point in the Lake County CWPP document was the prioritization of geographic areas for action; this focus is consistent with the increased group understanding of relative risk in various subsets of the broader planning area. The Lake County CWPP document contained evidence of all interviewee-identified elements of shared understanding (Table 3). For example, the Lake County CWPP planning document made strong statements about maintaining a collaborative approach into implementation and noted the creation of a committee to facilitate this intention.

The Lake County CWPP document expanded on shared understanding by focusing on public education as the primary strategy for wildfire prevention. In interviews, participants most commonly noted the build-up of “hazardous fuels” in the forest as the major cause of wildfire, but only one of the actions in the Lake County CWPP document related directly to fuel mitigation. From interviews with the facilitators, it was known that this group used a template CWPP from a previous process in a nearby county. It is possible that this template influenced the Lake County group’s adoption of education-based approaches to wildfire management.

Barnes-Drummond, Wisconsin CWPP

The action centerpiece of the Barnes-Drummond CWPP document was a list of specific wildfire prevention and suppression projects. Again, interview-identified elements of shared understanding were largely reflected in the CWPP document (Table 3). The exception was the emphasis in the interviews on inter-agency collaboration around wildfire – the document did not fully reflect this focus. For example, 14 of the 38 CWPP projects were initially created and situated within a single-agency and were listed as “ongoing”. Thus the CWPP acted partially as a compiling document for pre-existing plans. In some ways, this approach is consistent with the shared understanding for the need for greater agency communication. However, the compilation approach also indicates a level of “business as usual” within wildfire management. In Barnes-Drummond, implementation responsibility was handed to individual agencies rather than a collaborative committee.

Discussion

Scholars and practitioners alike have called for collaborative governance (Gray 1989; Wondolleck and Yaffee 2000). However, research has demonstrated that mandating collaboration may lead to unintended consequences or ineffective outcomes such as limited impacts on regional planning outcomes (Taylor and Schweitzer 2005), collaboration that is not locally self-sustaining (Genskow 2009), or even damaged organizational relationships if collaboration is not supported by additional governance mechanisms (Rodriguez et al. 2007). This research found that policy-mandated collaboration set the institutional context for learning by convening key stakeholders, but

that social learning and shared understanding are not automatic outcomes. As supported in other studies (Grayzeck-Souter et al. 2009), this study found that a flexible policy such as HFRA was met by diverse local contexts that influenced learning processes and outcomes within planning groups.

The two CWPP groups that demonstrated the strongest evidence of social learning engaged in communicative learning much more than instrumental learning. Thus, mandated collaborative wildfire planning did not foster the development of innovative substantive wildfire management practices as highlighted in some collaboration theory (e.g. Daniels and Walker 1996; Wondolleck and Yaffee 2000). CWPP participants continued using the same substantive approaches to wildfire planning as they did prior to collaboration. Research on wildfire policy indicates that this “business as usual” approach reflects a larger trend in US wildland fire management (Steelman and Burke 2007). Since most participants were agency professionals with previous knowledge of fire and land management, it is not surprising that gaining new skills and knowledge was not a strong learning outcome. Non-agency community participants with less previous knowledge of wildfire accounted for the primary instrumental learning, most of which was basic information about fire behavior and management. But through the CWPP process, agencies became better coordinated, collectively identified fire management as crucial in their area, assigned value and risk across land tenure boundaries, and created a new dedication to interagency coordination. Planning research highlights these benefits as important “first and second order” consequences of collaboration (Innes and Booher 1999). In institutionally complex contexts, creating shared relational understanding of

how to work across organizational boundaries is crucial to collaborative success (Bouwen and Taillieu 2004). It is noteworthy that positive communicative learning outcomes can emerge locally out of a policy-mandated collaboration from the federal level.

Transformative learning was not a strong learning outcome in the CWPP groups I investigated. However, transformative learning occurred in Lake County, MN where partners committed to collaborative implementation of wildfire plans. This group also had the greatest number of participants, the longest planning process, and the most meetings, once again highlighting the importance of process factors such as extended engagement and diverse stakeholder representation in fostering learning. Again, this learning primarily involved transforming institutional and organizational views of wildfire planning, rather than incorporating new substantive management practices. But, in dedicating resources to inter-agency implementation and allowing the time for extended interaction, participants in Lake County were able to imagine opportunities for collaboration and transformation beyond the scope of the CWPP. Collaboration is often a time- and energy-consuming enterprise for agency representatives (Wondolleck and Yaffee 2000). Participants can extend, enrich, and sustain the impact of collaboration by dedicating to a process of transformative learning that reaches beyond wildfire protection. Planning practitioners may broaden the influence of collaborative planning by constructing forums to promote learning by multiple partners on multiple scales. As Innes and Booher (1999, p. 415) suggest, “Learning and change can be the most far-reaching effects of consensus building”.

As other research on social learning highlights (Schusler et al. 2003; Pahl-Wostl and Hare 2004; Bull et al. 2008; Deyle and Slotterback 2009), I found that learning is a choice and not an automatic outcome of collaboration. In Taylor, FL, CWPP participants representing land management agencies entered the process with what they defined as a “pre-existing” shared understanding of the wildfire problem and believed they possessed the knowledge to effectively manage wildfire. Agency representatives worked towards these pre-existing understandings and did not leave themselves fully open to learning new approaches to wildfire management. Further, collaborative elements such as the small agency-dominated planning group and the short planning process may have limited the potential for social learning in Taylor. These findings are consistent with previous studies which have found that agency-affiliated collaborations are apt to assume the management strategies of their home organizations (Bidwell and Ryan 2006) and that organizational representatives are often disinclined to consider viewpoints outside of their agencies’ interests (Cheng and Daniels 2003). The CWPP groups investigated – all heavily agency-driven – did not seek out new science and innovation in wildfire management practice.

Social learning scholars note difficulty in linking learning to action (Bull et al. 2008; Muro and Jeffrey 2008). I used planning documents as a record of intended action and found that shared understanding developed during collaboration was reflected in proposed wildfire management actions. Thus, this research supports the claim that social learning and the creation of shared understanding does indeed influence what players are likely to do (Innes and Booher 1999). However, CWPP planning documents also

included actions that were beyond the scope of or were inconsistent with participant-identified shared understanding of wildfire management. Many of these actions were quite standard and could be jointly supported and promoted without engaging in a learning process. Thus, it is clear that social learning and shared understanding are not the sole determinants of collaborative action in wildfire planning groups.

Finally, HFRA dangles the carrot of funding as an incentive for initiating CWPP processes. Holding fund-seeking as the principal goal of the CWPP process does not preclude groups from engaging in social learning during planning. However, this incentive structure can lead to opportunistic use of the policy to accomplish action on the individual agency level without dedicating fully to a collaborative planning process. HFRA, in its current design, does not by itself encourage planning partners to engage in social learning to improve local coordination around wildfire management. Though policy provided the impetus for collaboration, stakeholders emphasized that “somebody” had to bring them together locally. This point underscores the importance of meeting external requirements for collaboration with local leadership (Genskow 2009). Decisions by state and local fire management leaders on how to frame and design the CWPP process strongly influence planning and learning outcomes.

Taken together, these findings suggest that the design of a collaboration-mandating policy influences learning processes and outcomes at the local level. Research on institutional design in natural resource management strongly supports this assertion (Ostrom 1990; Bidwell and Ryan 2006). Strong communicative and weak instrumental learning within CWPP groups is likely attributable to HFRA’s collaboration-mandating

policy strategy: HFRA focused on collaborative membership by requiring the participation of three individuals – the state forester, the local fire chief, and another “relevant” local official. These first two partners enter the collaborative planning arena with pre-existing institutionalized knowledge of wildfire; the attitude that the group already possesses sufficient knowledge may constrain participants from seeking out *new* knowledge on wildfire management practices (Bull et al. 2008). Further, the groups I investigated interpreted the policy-mandate quite narrowly, which may have precluded more significant transformational learning. HFRA’s design is flexible in that it does not designate a lead agency, there is no required non-local oversight of planning, and membership is open beyond three partners. This flexibility could encourage broad interpretation, innovation, and transformational learning at the local level. However, groups consisted of traditional agency partners and focused on existing management goals of fire suppression and fuels mitigation. Thus, the CWPP processes examined here were less about innovating practice and more about organizational coordination and creating collective momentum around fire management. However, this research also supports assertions by other scholars that elements of the planning process, such as number of participants and their previous knowledge, duration of planning and number of meetings, and presence of a facilitator influence social learning potential in a collaborative group (Schusler et al. 2003).

Since both legislation and local factors influence policy-mandated collaboration, future research could examine how the interplay between policy design and local context may influence planning outcomes. Additionally, different collaboration-mandating

strategies – such as institutional review of proposed plans by a non-local authority or requiring all collaborative groups to plan for wildfire according to a standardized template – may lead to different learning outcomes. Thus, studies may also investigate how varying policy strategies may affect learning processes and outcomes in mandated collaborations. Finally, despite short-term benefits, some have demonstrated limited impact of top-down, mandated collaboration over time (Genskow 2009). Longitudinal research may determine the impact of HFRA-mandated collaboration on learning and behavior beyond the official end of the planning process.

Conclusion

This article begins to answer the call for additional empirical research on social learning sounded by Muro and Jeffrey (2008) in this journal. I agree that “learning cannot be legislated” (Bull et al. 2008), but have shown that policy-mandated collaboration can be a convening element and may set the structural context for social learning at the local level. However, local context and collaborative process are crucial and policy must be realized at this level through leadership, skilled facilitation, dedication to expanding participant pools to non-traditional stakeholders such as community members and NGOs, and purposeful process design. Furthermore, the structure of legislation can influence the type of learning that is most likely to occur. I suggest a potential role for HFRA in enhancing inter-agency coordination, improving understanding of the broader wildfire management institutional system, and creating shared vision, but not necessarily in promoting advancement or transformation of substantive management practices. It is possible that enhanced coordination may be the primary goal of HFRA. However, most

wildfire scholars agree that innovation in practice, not just coordination, is necessary to improve management (Dombeck et al. 2004; Steelman and Burke 2007). If policy seeks to both spur innovation of substantive management practices and enhance cooperation through mandated collaborations, transformative learning must be set as an explicit planning objective at federal and local levels.

Chapter 2 - Burning through Organizational Boundaries? Inter-organizational Communication Networks in Policy-mandated Collaborative Bushfire Planning Groups

Introduction

Wildland Fire and Collaborative Environmental Planning

A central challenge for environmental governance is creating institutions that effectively attend to ecological phenomena as well as to socio-organizational dynamics (Ostrom 1990; Barham 2001; Folke et al. 2007). One concern is that natural resource agencies are generally delineated by level of government (municipal, state, federal) and driven by specific policy directives that narrow management focuses. Single-agency management may be administratively expedient, but may also emphasize organizational efficiency over managing for broader environmental goals such as watershed management, ecosystem restoration, and landscape-level biodiversity conservation (Dombeck 2004). Collaborative governance models hold that networks of organizations offer the flexibility, coordination, and innovation necessary to adequately address complex management issues that single agencies cannot (Ansell and Gash 2008). However, critics argue that maintaining organizational boundaries is necessary to preserve accountability and that multi-stakeholder approaches may be in conflict with democratic ideals of representation (Tewdwr-Jones and Allmendinger 1998). Thus, organizations are challenged to balance cooperation across boundaries with the traditional notion of an organization as a ‘boundary reinforcing’ entity with largely independent interests. Collaborative environmental planning (CEP) is a model of collaborative

governance that seeks to address cross-scale complexity through multi-stakeholder approaches. CEP scholars cite creation of new relationships, networking organizations, and coordination of management as the most impactful benefits of collaboration (Innes and Booher 1999; Wondolleck and Yaffee 2000; Booher and Innes 2002), but changes in these elements are also the most difficult to measure (Beierle 2002). CEP governance models are often used when the environmental system at hand extends beyond the boundary of any given organizational jurisdiction or substantive charter.

Wildland fire is one of those environmental phenomena that ‘burns through’ organizational, ecological, and geopolitical boundaries. A given wildfire may move through diversely-owned land from private, to industrial, to public forests. Wildland fire management is often understood in terms of the “4 Rs” of readiness, response, recovery and research. Wildland fire planning (falling under the “readiness” category) has emerged more prominently as a wildland fire management emphasis in recent years (Jakes and Nelson 2007). However, coordination in wildland fire planning is complex due to the assignment of management activities – such as suppression, fuels mitigation, and biodiversity conservation – along organizational lines. Wildland fire scholars propose that wildland fire planning would be improved by integrating these interdependent goals, enhancing coordination through the creation of inter-organizational networks, and ultimately contributing to innovation of wildland fire management institutions and practices (Dombeck et al. 2004; Stephens and Ruth 2005; Steelman and Burke 2007). Thus, CEP-based wildland fire planning has grown both in the US and internationally with goals of expanding inter-organizational planning networks. In the US, the Healthy

Forests Restoration Act of 2003 encouraged at-risk communities to collaboratively develop community wildfire protection plans. In New South Wales (NSW), Australia, Bush Fire Management Committees (committees) are directed to apply the concepts of CEP in Bush Fire Risk Management Planning (BFRMP). The NSW process is distinct from most grassroots CEP efforts since policy mandates planning, legislation determines group membership (the planning network), and the lead agency provides a template that sets the planning approach. Previous research on mandated collaboration in wildland fire planning has shown that both the design of the mandating policy and the local context influence collaborative outcomes (Grayzeck-Souter et al. 2009; Brummel et al. 2010), such as the formation of inter-organizational communication networks.

This paper presents findings from an investigation of inter-organizational communication networks existing before, developed during, and maintained after the BFRMP process in three NSW communities. Despite the growth of ‘network-centered’ literature, there are few studies that report on structured and in-depth analyses of network changes occurring as a result of CEP and none that investigate the formation of inter-organizational communication networks in mandated CEP contexts. The research reported here attempts to answer three questions: How does participation in policy-mandated collaboration affect bushfire communication networks among organizational representatives? How do contextual issues influence the development of inter-organizational communication networks? What are the effects of creating these relationships on participants, inter-organizational relationships, and bushfire management more broadly?

Research Approach: Social Networks and the Environment

Connection is a growing trend in natural resource management. Policy-makers and environmental management professionals seek to facilitate connection through the creation of social networks amongst stakeholders. In its most basic iteration, a social network “consists of a finite set of actors and the relation or relations defined on them” (Wasserman and Faust 1994). An “actor” can be an individual, an organization, or a nation-state. Actors form a network when relational ties develop among them, and linkages serve as conduits for the exchange or “flow” of material or immaterial resources. This research, for example, investigates “communication networks” between organizational representatives around a collaborative bushfire planning process. Social networks have been found to foster learning and joint understanding (Daniels and Walker 2001; Schusler et al. 2003) and to facilitate coordination, innovation, and the integration of management activities (Pretty and Smith 2004; Folke et al. 2005). Social network theory focuses on the primacy of social relationships in influencing behavior through providing constraints and opportunities to individuals (Wasserman and Faust 1994; Emirbayir 1997). As Granovetter (1985 p. 504) argues “Most behavior is closely embedded in networks of interpersonal relations”.

Much of the recent literature suggests that the expansion of networks is necessary to improve environmental and social outcomes in environmental management (e.g. Innes and Booher 1999; Pretty and Smith 2004; Janssen et al. 2006). For example, cross-organizational knowledge exchange may improve organizational performance (Reagans and McEvily 2003), enhance access to resources, and lead to innovated practices (Ruef

2002). Bodin and Crona (2009) propose four network characteristics – network density, cohesiveness (measured here as average geodesic distance), subgroup interconnectivity (measured as betweenness), and network centralization – as important in influencing actors’ ability to manage their relationships as well as the environment. Each of these measures is operationally defined in Table 4a and 4b. Greater density of relationships in networks may improve capacity for collective action (Diani 2003), knowledge sharing, and idea creation (Sandstrom and Carlsson 2008). Actors in networks with low average geodesic distances may be efficient at communicating information across the network quickly (Hanneman and Riddle 2005). Groups with high network betweenness may tend to ‘other’ distinct groups within the networks, which may lead to unproductive deliberations (Borgatti and Foster 2003). While high network centrality may improve coordination within a group (Sandstrom and Carlsson 2008; Bodin and Crona 2009), it can lead to disparities in power and influence (Diani 2003; Ernstson et al. 2008). Further, centralized networks are focused around a few prominent individuals and may not be compatible with the complex project of environmental governance (Bodin and Crona 2009).

It is important to note, however, that some scholars highlight potential pitfalls of expanding networks through CEP. Maintaining relationships outside of one’s organization can place strain on already over-extended managers (Wondolleck and Yaffee 2000; Imperial 2005). Further, some argue that decision-making that arises out of network governance can lead to “perverse learning” where partners with competing

Table 4a. A summary of the structural social network measures used in this chapter, including a description of the measurements as well as potential social meaning of these measurements for actors and for networks. All actor-level measures are normalized to facilitate comparison and all measures are for non-directional networks.

Structural Measure	Measurement	Social Meanings
<i>Network Density</i>	Network: The proportion of ties that are present amongst actors in the network in relation to the potential number of ties in a network. Expressed as a value between 0 and 1, where 1 indicates that all potential relationships in a network exist.	A measure of <i>network activity</i> (Wasserman and Faust 1994). A denser network can facilitate feelings of common identity and collective action (Diani 2001).
<i>Geodesic Distance (Network Average)</i>	Network: Geodesic distance is the shortest path between two actors in a network. Average geodesic distance takes the average geodesic distance between all pairs of actors in the network.	A measure of <i>network cohesion</i> (Wasserman and Faust, 1994). Actors in networks with low average geodesic distances may be efficient at communicating information across the network quite quickly (Hanneman and Riddle 2005).
<i>Degree Centrality</i>	Actor centrality: Non-normalized degree centrality is the number of ties, or in this case, the number of communication relationships that a given actor has. The normalized measure is expressed as the proportion of other actors in the network with whom a given actor has a communication relationship.	Actor-level: A measure of <i>prominence, involvement, and visibility</i> in a network (Wasserman and Faust 1994). The more central an actor is, the more influential within the network they may be (Degegne and Forsé 1999).
	Network centralization: Measures the range or variability of individual actor degree centrality. The measure ranges between 0 and 1, and is expressed as a percent. Network centrality of 100% indicates that there is one central actor with whom all the other actors singly interact.	Network-level: A measure of equal actor involvement across the network. Networks with high levels of centrality may be better able to coordinate themselves, but they also may be less likely to solve complex issues and undergo creative learning processes.

Table 4b. A summary of the structural social network measures used in this chapter, including a description of the measurements as well as potential social meaning of these measurements for actors and for networks. All actor-level measures are normalized to facilitate comparison and all measures are for non-directional networks.

Structural Measure	Measurement	Social Meanings
<i>Betweenness</i>	<p>Actor betweenness: The number of times that a given actor is on the shortest network path that connects or is “between” two other actors in a network. Betweenness measures how much a given actor “contributes to decreasing the distance between other actors in a network” (Bodin et al. 2006). Betweenness centrality is normalized by dividing by the maximum betweenness for a node.</p> <p>Network betweenness: Measures heterogeneity of actor-level betweenness measurements in a group. The measure varies between 0 and 1 and is then represented as a percent, so that a network where every actor has equal betweenness measures would have a group betweenness of 100%.</p>	<p>Actor-level: A measure of <i>interpersonal influence</i> and <i>information control</i> (Wasserman and Faust 1994). Individual actors with high betweenness are vital bridges between groups or individuals (Freeman 1979).</p> <p>Network-level: A measure of <i>modularity</i> – or the propensity to develop multiple groups -- in a network (Bodin and Crona 2006). Groups with high network betweenness may tend to ‘other’ distinct groups within the networks, which may lead to unproductive deliberations (Borgatti and Foster 2003).</p>

perspectives adopt the lowest common denominator of shared interests (McCloskey 1996; Ascher 2001), leading to the standardization of approaches (Tewdwr-Jones and Allmendinger 1998). Others critique network-focused participatory planning for producing negative power effects and reinforcing dominant/elitist structures (Cooke and Kothari 2001). Accordingly, I interpret network changes with a critical eye towards relational and power dynamics and do not assume that changes in network structure automatically give rise to redistribution of power.

This research focuses on inter-organizational communication networks – a particular form of social network – existing before, developed during, and maintained after a mandated collaborative bushfire planning process. Communication is the most common currency amongst diverse participants and is an important indication of one’s degree of engagement in a CEP network. Further, communication that occurs between organizational representatives during planning can have implications for wildland fire management at the organizational level. As Dal Fiore (2007, p. 861) writes, such “...networks are the places for boundary-spanning learning” in that they tend towards evolution of ideas, creative communication, and a sense of comparing. The planning network examined in this research functions as an inter-organizational network because participants are directed to represent their organizations during planning. Organizations only ‘communicate’ in as much as individual representatives for organizations communicate; the individual representative behaves as the network actor since they communicate, share information, and actively participate in the planning process. Mandarano (2009) investigated the creation of inter-organizational networks within a

voluntary estuary restoration CEP process and found increased number and strength of knowledge, resources, and funding exchange relationships amongst participants.

However, research on state-initiated collaborative river-basin management found that 10 years after initiating partnerships, half of these CEP networks were no longer active (Genskow 2009), calling into question temporal patterns in network formation and dissolution around mandated CEP efforts. Others have found that mandated collaboration failed to enhance inter-organizational relationships, and that social networks may even deteriorate during planning if collaboration is not supported by multiple governance mechanisms (Rodriguez et al. 2007).

Social Network Analysis (SNA) has gained prominence in environmental social science research as a means to investigate relational and structural properties of social organization around natural resource management (e.g. Crona and Bodin 2006; Sandstrom and Carlsson 2008; Mandarano 2009). SNA takes a quantitative and decidedly reductionist approach to understanding relationships by evaluating the presence, absence, and sometimes the value (i.e. frequency, strength, quality of interaction) of a relational tie. By simplifying relationships, researchers are able to measure structural qualities of a social system. However, purely quantitative analyses may overlook contextual elements and interpersonal understanding of social processes that may be better captured through qualitative methodology. When considering the classic sociological debate of structure versus agency, SNA is often critiqued as underemphasizing the agency and social-psychology of the individual. However, the individual is often the focus of SNA and

networks provide one layer of social context towards explaining behavior. Thus, I reject the either-or proposition of structure *versus* agency.

This study makes a unique contribution to the literature by using multiple case studies with a mixed-method qualitative/SNA approach to examine how inter-organizational communication networks may change through a policy-mandated CEP effort over time, in different contexts, and how network changes may affect organizational relationships and bushfire management more broadly. Many studies of social networks in natural resource management use single case studies or do not focus on longitudinal changes in networks. Further, mandated collaboration is still a relatively unexamined innovation in environmental management and public policy. Ultimately, the findings contribute to my evaluation of mandated collaboration as a policy tool and to ongoing discussions about sustainable wildland fire planning and policy.

Methods

The Bushfire Planning Network

Bush Fire Management Committees (subsequently referred to as “committees”) are created under the New South Wales (NSW) Rural Fires Act (1997) to “...*provide a forum for cooperative and coordinated bush fire management in their Areas*” (BFCC Policy No 1/2006, p. 1). The policy calls for the establishment of committees for each of the 44 NSW rural fire zones and identifies 15 potential committee members, though more can be added as locally appropriate. Participation in the committee is not itself mandated, but the policy requires that all parties on the legislated list be invited. Committees are required to collaboratively create a Bush Fire Risk Management Plan (subsequently

referred to as “the plan” or “the planning process”), and to update the plan every five years to “...*minimise the risk of adverse impact of bush fires on life, property, and the environment*” (Annex B, BFCC Policy 1/2008). Though committees generally meet 2-4 times a year for regular business, they hold additional meetings during planning years, interacting more frequently and substantively during this time. All members of the committee may participate in the planning process or a subgroup may act as a standing committee to create the plan, which is then reviewed by the entire committee. At the time of this study, the NSW Rural Fire Service (RFS) had recently developed a new spatially-explicit risk management software to guide the bushfire planning process.

For this study, the bushfire planning process is analyzed as an opportunity to create and enhance inter-organizational communication networks supporting bushfire management. In line with recommendations by Bodin and Crona (2009), this research investigates the influence of the planning process on inter-organizational networks as indicated by changes in network density, degree centrality, betweenness centrality, and geodesic distance in planning networks (see Tables 4a and 4b for definitions).

Case Selection and Description

I conducted case studies of three planning groups that were pilots for the new planning process (Figure 2). At the commencement of this study, these were the only groups that had completed the bushfire planning process. The NSW RFS selected these three committees as pilots because they represented the diversity of social contexts, ecosystem contexts, and fire risks in the state.

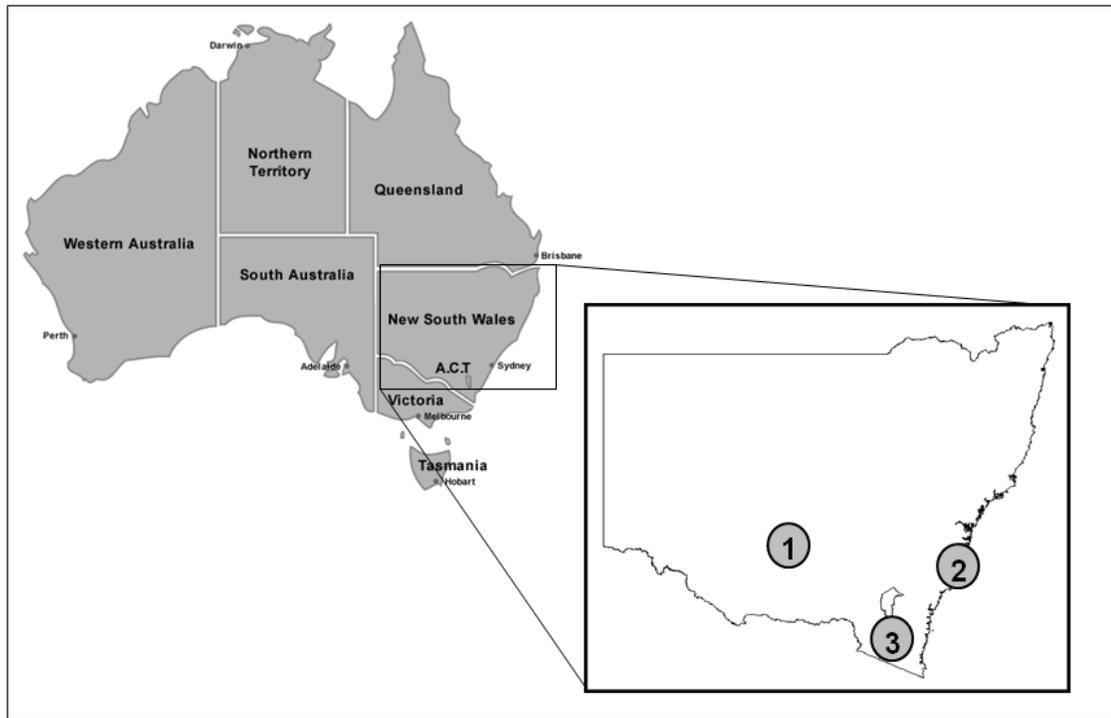


Figure 2. Map of Australia, featuring the state of New South Wales and the three case studies of collaborative bushfire planning conducted: (1) Murrumbidgee Irrigation Area, (2) Illawarra, and (3) Snowy-Monaro.

Murrumbidgee Irrigation Area Zone

The Murrumbidgee Irrigation Area (MIA) covers 10,432 km² and four local government areas in southwest New South Wales. The MIA is primarily agricultural, with a system of irrigation canals in parts of the planning area. Areas that have not been altered for agriculture are primarily grassland and river red gum, a eucalypt forest type. MIA zone's population is nearly 45,640, with four small population centers. Compared to the other case studies, MIA does not have a history of frequent fire and is thought of as a low fire risk area. Most of the planning area is privately-owned, although there are small sections of NSW National Parks, NSW Department of Lands, and NSW State Forest lands.

Illawarra Zone

The Illawarra is a coastal area directly south of Sydney with an area of 1129 km² that contains three local government areas. The area is characterized by a large escarpment that runs north-south; most of the 271,500 residents of the Illawarra area live between the coast and this escarpment. The escarpment and plateau are heavily forested with dry sclerophyll forests – forests of hard-leaved trees dominated by eucalypts with an understory of shrubs – and patches of fire-sensitive rainforest refugia. The Illawarra zone has a history of large bushfires, the most recent of which was in late 2001-early 2002 and burned areas in the north of the planning area, both above and below the escarpment. There is a large National Park in the north of this planning area, as well as the publically-managed Sydney Water Catchment Authority area that provides drinking water to the residents of Sydney. Mining companies are among the largest private landowners in the zone. Much of the other land is municipally-owned or managed by electricity providers or the NSW Roads and Traffic Authority.

Snowy-Monaro Zone

The Snowy-Monaro zone is an inland area of 11,259 km² that includes two local government areas and most of NSW's largest National Park, Kosciuszko. The landscape is quite diverse in that it contains large tracts of agricultural land, wet and dry sclerophyll forest types, and unique sub-alpine ecosystems of alpine ash and snow gum forests. The permanent population of this zone is nearly 17,000, though population increases during winter ski season and summer hiking season. The area is considered quite high in fire risk and has a relatively frequent fire occurrence. In 2003, a significant portion of the National

Park and adjacent private lands burned in a bushfire that destroyed numerous structures, but claimed no human lives. More than a quarter of the planning area is managed by NSW National Parks, but there are also a number of NSW State Forest pine and eucalypt plantations. Much of the rest of the area is privately-owned and -managed.

Data Collection

Interviews

In investigating inter-organizational communication networks, I conducted 44 interviews with committee members in MIA (n=11), Illawarra (n=12), and Snowy - Monaro (n=21). Interviewees were active participants in the planning process (based on planning meeting attendance and/or identification by other planning participants) and represented the array of organizations within each planning group. Striving for complete coverage, I interviewed 77% of planning participants across case studies and all of the planning participants that interviewees and facilitators identified as being the most active. The semi-structured interviews centered on understanding the planning context, process, and outcomes, focusing specifically on changes in inter-organizational relationships (Appendix 2). With the permission of interviewees, I digitally recorded all interviews, which ranged in length between 30 minutes and 2 hours. Interviews were transcribed verbatim from audio and then checked by a second transcriptionist for accuracy.

Social Network Survey

To collect quantitative data on structural changes in social networks, I administered 37 social network surveys (MIA = 11, Illawarra = 10, Snowy-Monaro = 16)

to participants who reported themselves as being at least moderately active in the planning process (84% of interviewees). The questionnaire asked participants to report the presence or absence of communication regarding bushfire issues with each of the other planning participants (identified by organization and name) before, during, and after the planning process (Appendix 3).

Data Analysis

Interview Data Analysis

I coded interview text for social network themes using the qualitative analysis software NVivo 8. I designed a coding scheme to examine personal accounts of the presence, quality (e.g. improved, degraded, more frequent communication), and influence of inter-organizational relationships before, during, and after the completion of planning. I developed codes iteratively as themes emerged, and ultimately completed several cycles of coding to identify patterns across and differences between interviewees, types of representatives, and planning contexts.

Social Network Analysis

I constructed a series of complete communication networks – one before-planning, one during-planning, and one after-planning – for each of the three case study groups. I symmetrized relationships so that a tie was included only if both actors it connected had reported the communication relationship as active. Using the SNA software UCINET 6.232, I measured network density, network degree centralization, network betweenness centralization, and network average geodesic distance for each

network (Table 4a and 4b). I also measured node-level degree centrality and betweenness centrality for all players (Table 4a and 4b). I illustrated the networks using NetDraw, specifying Spring Embedding configuration with node repulsion and equal edge length. The Spring Embedding algorithm utilizes iterative fitting to place nodes with the smallest path lengths closer in the network layout, while creating enough distance between nodes and placing ties so that distances between adjacent nodes are similar (Hanneman and Riddle 2005).

Results and Discussion

This study investigated how participation in a mandated collaborative bushfire planning process affected inter-organizational communication networks. Participants created and enhanced inter-organizational networks during the planning process. Further, inter-organizational communication became less hierarchical and participants became more directly connected to each other during planning. However, inter-organizational communication dropped off to varying degrees after planning was completed. Thus, legislatively-mandated CEP had the *potential* to enhance inter-organizational communication networks, but with several important contingencies; contextual factors such as the conflict history, group size, process management, and the design of the collaborative mandate may influence the creation of cross-boundary networks.

Pre-Planning Communication Networks

Previous research on CEP (e.g. Selin and Chavez 1995; Bentrup 2001) found that antecedents to collaboration – such as a previous relationships or a history of antagonism

– influence collaborative success. Examining pre-planning communication relationships provides a baseline of understanding important for interpreting changes in the network. The pre-planning bushfire communication network varied across cases, but density measures demonstrated that network activity was generally low or moderate (Table 5). The Snowy-Monaro and MIA groups had the most active networks, while the Illawarra group was less active prior to the planning process. Previous relationships were commonly forged around fire suppression and/or previous non-planning related interactions on the committee. However, fire suppression relationships were restricted to those participants that represented fire-response agencies. Indeed, representatives of many non-bushfire organizations such as rail, energy, and mining had worked on their own with bushfire issues and had limited relationships with fire agencies prior to the planning process:

“We sort of were on our own for years [with regard to fire management and planning]...it was pretty dangerous... it was pretty scary what we did [on our own].” (MIA)

Centrality analyses of pre-planning networks supported interview assertions that agency representatives such as the Rural Fire Service (RFS) and National Parks were the central communication nodes in all three of the planning groups (Table 5, Figure 3). Many participants confirmed that the RFS was their primary source of information about bushfire prior to planning.

While communication ties existed prior to the planning process and were largely congenial in MIA and Illawarra, many Snowy-Monaro relationships were rooted in

previous disagreements about bushfire. Tensions stemmed from the 2003 bushfires and the belief that mismanagement of the NSW National Parks contributed to their intensity. The recent bushfires, discourses of blame, and disagreements about appropriate bushfire management were the central lenses through which parties understood inter-organizational relationships.

“... Some people have had an axe to grind for many, many, many years ...”
(Snowy-Monaro)

“Our whole life, whether we like it or not, is before the fires and after the fires.”
(Snowy-Monaro)

Thus prior to the planning process, some members of the Snowy-Monaro group perpetuated an ‘us-them’ mentality tied to their position on fire management practices.

During-Planning Communication Networks

This research supports previous studies which demonstrate the capacity of CEP to create and enhance relationships amongst stakeholders (e.g. Mandarano 2009). During the 12-18 months of the planning process (which included between 6-12 meetings), bushfire communication networks amongst participants became more active and connected, as measured by increased density and decreased average geodesic distance (Table 5). Participants underscored this enhanced communication in interviews.

“We have gotten together quite a lot more frequently... you get to [planning participants] a bit better than just a face in this big meeting with about 40 other representatives that you’ve never met before.” (Illawarra)

Thus, planning meetings were a forum to create and reconnect relationships.

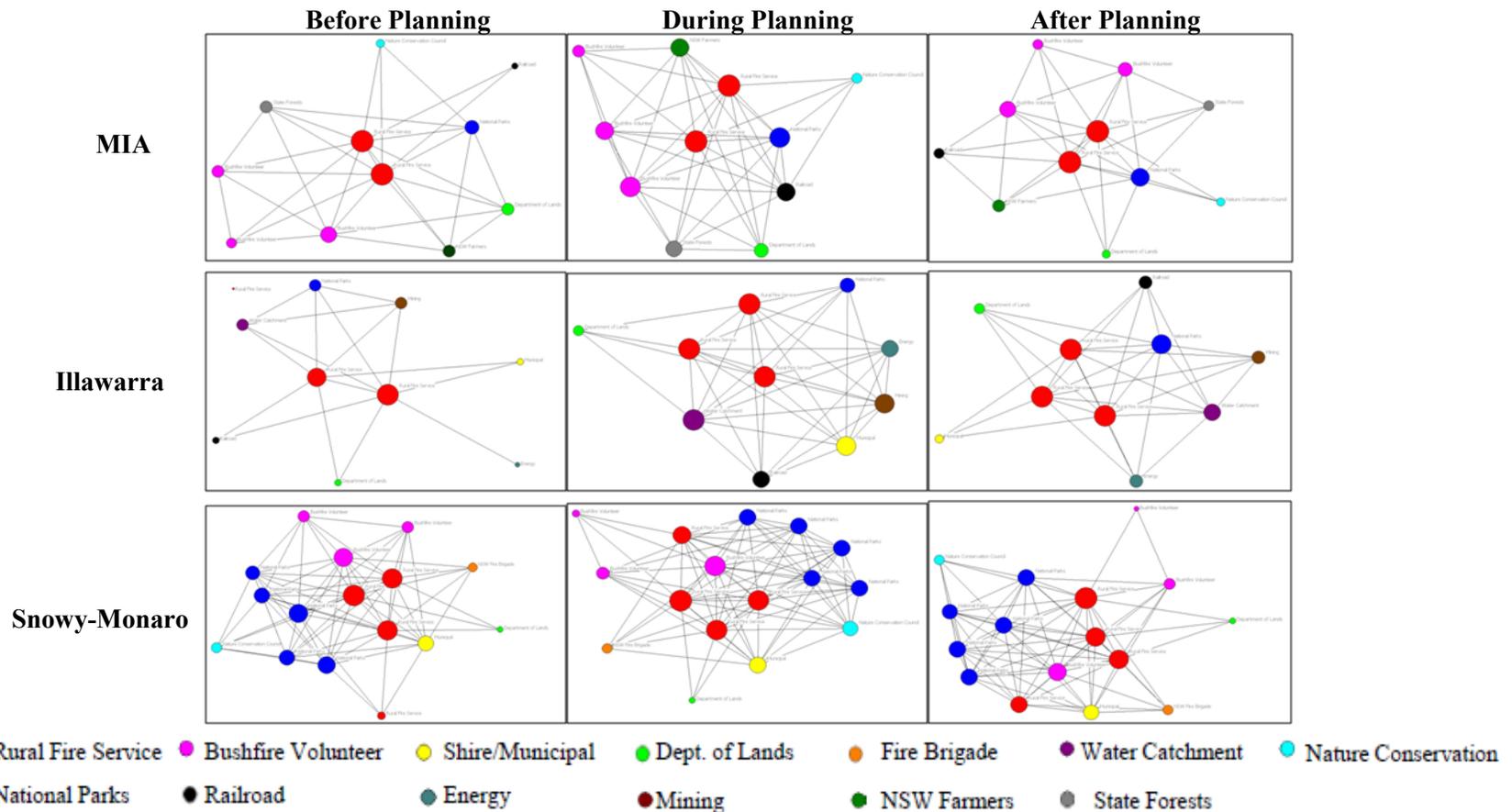


Figure 3. Inter-organizational communication networks before, during, and after the collaborative bushfire planning process. Density of the network is visible through the number of ties. Node size indicates node-level degree centrality, and the range in node size within a given graph indicates network centralization. The more similar the nodes in size, the less centralized the network. Networks are visualized in NetDraw using Spring Embedding configuration with node repulsion and equal edge length.

Table 5. Summary of changes in structural network measures before, during, and after the planning process.

NETWORK MEASURE	MIA 11 Network Actors			ILLAWARRA 10 Network Actors			SNOWY-MONARO 16 Network Actors		
	<i>Before</i>	<i>During</i>	<i>After</i>	<i>Before</i>	<i>During</i>	<i>After</i>	<i>Before</i>	<i>During</i>	<i>After</i>
<i>Density</i>	0.56	0.76 (+35%) ^a	0.58 (+3%) ^a	0.38	0.84 (+124%)	0.71 (+88%)	0.61	0.69 (+14%)	0.63 (+4%)
<i>Betweenness Network Centralization</i>	18.17%	4.96% (-73%)	14.85% (-18%)	34.26%	2.73% (-92%)	7.10% (-79%)	7.52%	7.86% (+4%)	16.97% (+126)
<i>Degree Centrality Network Centralization</i>	53.33%	28.89% (-46%)	51.11% (-4%)	63.89%	19.44% (-70%)	36.11% (-44%)	37.14%	35.24% (-5%)	41.90% (+13%)
<i>Geodesic Distance (Average)</i>	1.44	1.24 (-14%)	1.42 (-1%)	1.53	1.16 (-24%)	1.29 (-16%)	1.39	1.31 (-6%)	1.37 (-2%)

^aThe percentages in parentheses indicate the percent and the direction of change for each measure as relating to the “before planning” network measures.

Theoretically, participation in CEP may empower greater equality of voice and influence among participants (Kesby 2007). Though RFS employees were the most central communicators (Figure 3), network-level degree centralization measures decreased across all groups during planning (Table 5). This shift indicates that individual node centralities were more similar – and that actors were, by this measure, more ‘equal’ – during the planning process than they were prior. Network-level betweenness in the MIA and Illawarra groups also decreased during planning (Table 5). Reduced betweenness means that planning groups relied less on a select group of participants to act as information brokers and may be more resilient to changes in staff/representatives. In less-centralized planning groups such as these, other scholars have proposed that disparities in power and influence may be diminished (Diani 2003; Ernstson 2008) and groups may be more likely to innovatively address complex issues (Bodin and Crona 2009). Further, studies suggest that lower network betweenness indicates the existence of fewer subgroups that could facilitate an ‘us-them’ mentality during planning (Borgatti and Foster 2003).

As already mentioned, local context and history have the potential to influence CEP and the creation of inter-organizational networks (Selin and Chavez 1995). Though planning committees operated under the same mandate and planning processes were essentially identical, the magnitude of network transformation was variable according to critical contextual elements such as committee size, history of conflict, and recent fire. The Illawarra group saw the greatest change in network measures, potentially due to their relatively low level of pre-planning network activity (Table 5). MIA network measures

changed modestly relative to the Illawarra planning group. However, the Snowy-Monaro group showed relatively minimal network changes during planning. This may be due in part to higher pre-planning communication network activity attributable to previous communication driven by the 2003 fires. However, this group also had the least active, least connected, most centralized, and most between ‘during planning’ measurements of any group. Similar to previous scholars examining conflict in CEP (Ansell and Gash 2008), I argue that this group owes its lower ‘during planning’ communication network activity, in part, to perceived social barriers due to inter-organizational conflict around the 2003 bushfires.

Though structural network measures show an increasing ‘equality’ in communication among planning participants and CEP literature proposes diverse and meaningful engagement as a potential collaborative benefit (Gray 1989; Innes and Booher 1999; Wondolleck and Yaffee 2000; Margerum 2002), interviews with participants revealed that increasing equality in patterns of communication did not translate to equal influence within the planning process. Participants singled-out RFS paid staff as the drivers of the planning process noting that “*they did most of the work.*” Though RFS staff pushed the notion of ‘tenure-blind’ planning and emphasized mutual ownership of plans, participants noted that this was not the reality of the planning process. The RFS owes some of its centrality to ownership of the risk planning software, to their expertise, and to their administration of the planning process:

“...The large part falls on the Rural Fire Service because they’ve got ownership of the software... So they basically end up having to do the work on it... They don’t like to say it, and they try to avoid it, but they’re the people who are running the whole process... They’re the leaders, they have the knowledge and resources together.” (Illawarra)

Thus, as other scholars have noted “...When one organization has disproportionate control over the resources necessary to undertake collaborative activities, it gains power that others lack” (Imperial 2005).

Collaborative partnerships often lean on public agency representatives for resources and support (Bidwell and Ryan 2006). Similarly, in this study, interviewees identified a consistent list of public land-owning agencies as ‘major players’ in terms of their influence.

“There’s an executive [group] who really have the power...made of the people who own the fire prone land...” (MIA)

This dominance may be due in part to the centrality and visibility of these players in communication network, which is one of the characteristics of actor-level centrality suggested by Wasserman and Faust (1994). However, this centrality may be a consequence of legislatively-mandated collaboration: institutionalizing collaboration in legislation lends itself to placing certain administrative power in the hands of established public organizations. Such agencies are stable, have integrated scales of leadership, and often discussed having a greater stake in landscape-level planning since they are accountable to the public and subject to governmental audits. Conversely, non-agency representatives and volunteers found it difficult to be a driving force in this

institutionalized planning process. Participants such as RFS volunteers and volunteer representatives for the Nature Conservation Council consistently remained peripheral in communication networks (Figure 3). Some non-fire professionals felt that they did not have the expertise to legitimately influence the group.

“It’s a lot to understand and take in, when you’re not working with this all the time. It’s bloody ridiculous. Keep it simple...it’s very, very hard to understand. It was a lot to take-in in a short period of time.” (Snowy-Monaro)

Thus, it was challenging for volunteers to comment on any of the decisions, which – as other authors have argued (Fischer 2000) – is often the case in technologically-driven planning contexts.

Numerous studies demonstrate the importance of process elements in CEP success (Schusler et al. 2003; Ansell and Gash 2008), including facilitation, open communication, and democratic process. In these case studies, collaborative process and process management contributed to the centrality and influence of the Rural Fire Service, and reduced opportunities for direct inter-organizational engagement between other organizational representatives during planning. Planning groups were provided a planning template created by the RFS which defined goals and set a specific path for the planning process based upon identifying assets at risk, estimating risk, and then assigning a hazard treatment. Participants in all groups described a planning process where each land-owning organization provided information on their property to an RFS staff member, who then compiled the data. Scholars underscore the importance of bridging organizations for supporting and lowering the cost of collaborative planning processes

(Folke et al. 2005). While our structural data hinted that the RFS may be operating as a bridging organization, interview data clarified that the RFS acted more as a pooling organization. For example, RFS representatives were consistently the most central players structurally (Figure 2). However, participants indicated that many aspects of planning were consolidative, with each representative providing data on the land they managed to one RFS administrator.

“Well, the process is, basically, we’re feeding the information that we want into the employed staff. And it’s [RFS employee’s] interpretation. If [RFS employee] has questions [they’ll] come to ask people but [RFS employee] is basically driving it.” (Snowy-Monaro)

While pooling tasks within one organization may have facilitated the creation of a strategic planning document, it did not foster collaborative goal-setting, creative dialogue, or innovation on the local level, found by many to be hallmarks of successful collaboration (Gray 1989; Innes and Booher 1999; Margerum 2002).

The collaborative process influenced who were and who were not the primary players, as well as the ways representatives engaged with each other during planning. In planning committees, the rationality of the asset-based planning framework compounded the centrality and influence of public-land-owning agencies, diminished centrality and influence of volunteers and non-land owning organizations (Figure 3), and focused participants on their own land rather than on landscape-level concerns. While the RFS designed the planning process to be tenure-blind, many landowning participants only commented on their “own bit” and many non-landowning participants did not feel justified in commenting at all. The asset-based process focused participants on the assets

within tracts of land that were ‘owned’ by the representative who managed them. One participant described the interactions within the planning process in terms of “*working for the [agency] badge*”. Non-agency representatives were generally unquestioning of land-managers’ expertise and trusted others to know their own land.

“...People...were quite happy to just sort of [say]...they know that area, they know that patch of ground... they were quite happy to take the dialogue at the face value.” (Illawarra)

Given the practice of engaging primarily with the land that participants represent, non-land-owning entities did not have strong voice or influence in planning:

“I watch, yes, I observe. My input is minimal...People don’t tend to cross over into other people’s areas.... I wouldn’t get involved in it because it’s not my right to or field to do it.” (Snowy-Monaro)

Representatives of non-landowning interests often were not included in asset-related steps of the collaborative planning process.

“Now all of that sort of stuff on identifying...key assets... [agency representatives] came with having done a lot of work on that before they ever came to the committee...So they know these things and they all readily agreed ... they all understood it, whereas I didn’t...” (Snowy-Monaro)

Often, participants with opportunity to comment on other representatives’ land bases simply were not concerned with actions outside of their management boundaries:

“To be blunt, what happened beyond the Park doesn’t really worry me. You know, if they assessed a town away from the park as an extreme risk and I don’t think it is ...I’m not going to raise that as an issue.” (Snowy-Monaro)

Thus, the planning was a task-based process where focal points were the planning document and the land which it covered, rather than the people, their ideas, and their interests.

After-Planning Communication Networks

Though the creation of relationships is often put forth as one of the most intangible, but long-lasting benefits of CEP (Innes and Booher 1999), findings indicate that, approximately 2 months after completing the bulk of the planning work, the planning process had varying degrees of influence on bushfire communication networks (Table 5). For all groups, the ‘after planning’ bushfire communication network was less active, more centralized, and more heterogeneous than during the planning process. These findings highlight the often over-looked temporal dynamics of social networks in CEP. By evaluating multiple stages in planning, the longitudinal changes in inter-organizational relationships start to become clear. In MIA, for example, though network activity was enhanced during planning, structural aspects of the network (density, centralization, average geodesic distance) before and after the process were similar (Table 5), suggesting that the planning process may not have had broad and lasting effects on communication networks.

The Snowy-Monaro group actually saw deterioration in certain network measures after planning. The post-planning communication network was more centralized and had

considerably higher betweenness measures than before or during the planning process. While the post-planning communication network was slightly denser and participants were somewhat closer to each other than before planning, the increased centrality and betweenness measures suggest that a few members became more important to the planning group, while others became more peripheral. Longstanding disagreements about fire management and the antagonistic ‘othering’ of participants – a well-documented barrier to collaboration (Gray 1989; Margerum 2002; Ansell and Gash 2008) – was likely a barrier to meaningful and lasting communication.

The Illawarra group maintained the complex network they had gained during the planning process to a greater extent than any other group (Table 5). Their communication network was 88% denser after planning than it was prior. This increase in network activity may improve capacity for collective action across organizational boundaries, as suggested by other scholars (Diani 2003) and emphasized by planning partners.

“For me, [the planning process was] also getting those contacts. I could easily ring up any person in this committee and just chat about an issue and resolve something or cooperatively do something.” (Illawarra)

Similarly, the network was 44% less centralized than it was prior to the process, meaning that communication was more equal across participants, rather than there being a few key communicators in the group. Further, the group had 79% lower betweenness, and diminished average distance between planning participants after the process than when it began. All of these measures indicate that members of the Illawarra planning group were more connected to each other after the process than they were when the process began.

Context, including a smaller planning committee size, influenced the Illawarra group in maintaining these network characteristics more so than the other planning groups. The small size of the Illawarra group likely contributed to enhanced network outcomes since participants had fewer people with whom to maintain relationships. In contrast, MIA and Snowy-Monaro were larger planning groups that included all members of the BFMC. Scholars caution against the kind of centralized approach that funnels all collaborative activities through the same structure (used in MIA and Snowy-Monaro) as it can increase transaction costs by involving non-relevant participants without providing them benefit (Imperial 2005). This might be avoided by creating a smaller planning subgroup as the Illawarra group did. However, designating a boundary around collaborative membership can be contentious and creating a smaller group may also mean reducing representational diversity. Thus, groups should be aware of balancing smallness with diverseness so as not to exclude critical participants, especially since some scholars have found that *increasing* the number of different types of stakeholders leads to greater belief in the legitimacy of collaborative governance (Schneider et al. 2003). However, reducing the number of participants from any *one* organization may diminish the ‘us-them’ mentality that can emerge within CEP (Imperial 2005).

Effects of Network Changes

Qualitative accounts by participants added richness to SNA findings by enhancing understanding of the effects of some of these structural network changes on participants’ inter-organizational relationships. Previous research has shown that consensus-based processes can lead to both positive and negative changes in participants’

perceptions of the process and the substance of the issue hand (Schively 2007). Whether a participant evaluated the process as positive, neutral, or negative varied primarily by group, and was tied to contextual factors such as planning group size, the salience of fire as a management concern, and the history of inter-agency conflict.

Most participants in MIA, Illawarra, and several in Snowy-Monaro viewed the effect of the planning process on bushfire management and inter-organizational relationships as positive. Participants spoke about the process resulting in greater unification of the group.

“...This has happened in this way that everybody comes together and we can all work for a common cause; there's uniformity there, commonality.” (MIA)

Focusing on the importance of communication, participants created a more extensive network that they will be able to draw upon beyond the process:

“[The planning process has] given us a very, very close communicative stream for quite a period of time. I think now that we've established that, it will be reasonably easy to maintain.” (Illawarra)

So while some participants may not have maintained relationships in the months directly after planning, they felt confident they could maintain relationships long-term.

Similar to Brummel et al.'s (2010) findings regarding US collaborative wildfire planning groups, Australian participants indicated that communicative learning – or learning about motivations and values (Mezirow 1994) – provided a better understanding of why other organizations do things the way they do, the basis for other players' diverse

perspectives on bushfire management, and policies that dictate others' approaches to bushfire.

"I think it's probably given all agencies a better understanding of each other's roles and responsibilities and objectives, which I think always makes it easier to work with other agencies when you understand where each other is coming from...So I think from that perspective, we all would have learned from each other and that's really valuable." (Illawarra)

Also similar to studies in the US (e.g. Brummel et al. 2010), NSW participants emphasized the importance of inter-organizational coordination as a planning outcome, but qualified that they did not innovate substantive management practices, as many theorists believe CEP often can (Innes and Booher 1999; Wondolleck and Yaffee 2000).

"So ... as I said... [planning] didn't necessarily move the focus from us working along the lines of what you would probably normally do." (Snowy-Monaro)

These participants saw the planning process as simply formalizing already-existing fire management approaches on paper, which is a common phenomenon found in other CEP studies (Cheng and Daniels 2003; Bidwell and Ryan 2006). Thus, the planning mandate connected people and tracts of land, but did not push participants to innovate or integrate views on wildland fire management across the landscape.

Some planning participants were more conservative when evaluating the impact of the planning process on bushfire management and on inter-organizational relationships. Snowy-Monaro participants most commonly expressed a moderate view:

“Generally I don’t think I’ve got any better or worse relationships out of this.”
(Snowy-Monaro)

Others in the Snowy-Monaro group felt that relationships did not change because of intractable perspectives on bushfire management:

“No, I don’t think [relationships changed] ...there is some underlying philosophical differences in the way people view things...” (Snowy-Monaro)

These and other findings suggest that more transformative social change in highly contested contexts is probably not achievable within the span of a single planning process.

Several Snowy-Monaro representatives were negative or fatalistic about the effects of the mandated planning process on inter-organizational relationships in their zone. These participants saw planning as an extension of the conflict that grew out of the 2003 fires. A number of the RFS volunteers and some staff were emphatic that the National Parks should be doing more hazard reduction burning within the parks, which reflects broader competing discourses in Australia (Mercer and Whittaker 2004).

“... We want to get back to good serious broad-acre burns...A farmer on this side [of the park boundary] ...has to manage [his country] and run it productively to make a living. He can't just put a fence up and shut it up.” (Snowy-Monaro)

However, there is disagreement, both in the scientific community and the fire management community, as to the efficacy of burning to reduce fuels in Australian alpine and sub-alpine forests. Some scientists suggest that burning actually increases fuel loads due to re-growth of the brushy layer (Fernandes and Botelho 2003) and frequent burning

reduces biodiversity and ecological value in eucalypt forests (Gill 1981). This tension between conservation and hazard mitigation posed a challenge for National Parks representatives:

“...under our act, we’ve got an obligation ... to make sure that we don’t have fires escaping out of the park, we put a lot of effort into that. But also we’ve got our role to make sure that we’re protecting the flora and fauna species....That was the thing I was involved in: trying to get a balance between looking after the flora and fauna values and looking after life and property.” (Snowy-Monaro)

Though National Parks representatives pushed back on others’ calls for more burning due to their concern for ecological values, they noted that they did not have much political leverage in the planning process because of finger-pointing relating to the management of 2003 fires. According to some interviewees, though fire scientists said the National Park should cut down on burning after the fires to let the forests recover, their plan contained five times more proposed prescribed burning hectares on National Parks land than in any previous plan. As one National Parks representative said: *“But the basic reason for it is we can’t argue “no” any more. It’s kind of suicide politically.”* Wildland fire is often a catalyst for social conflict (Carroll 2006), so it is not surprising that the Snowy-Monaro group saw recent fires contributing to intractability in the planning process.

Though the planning process provided a forum for interaction, several participants were unsatisfied with the content of the final plan. Some RFS volunteers attributed what they saw as an unacceptable planning outcome to the varying perspectives on fire management amongst the National Parks, the Rural Fire Service, and RFS volunteers.

They articulated conflicts or contradictions between academic knowledge and local knowledge when trying to make sense of why the process did not accomplish what they hoped it would:

“It’s due to too many academics putting plans like this together without consulting people on the ground.... Everybody wants a plan or they want to put something on paper before they can approach things or do things, you know? They can’t just do it off their own bats. And we understand that too, but you don’t need something like this.” (Snowy-Monaro)

However, some interviewees pointed to other participants’ approach to engaging during the process, saying that the diverse group failed to come to a shared understanding of fire management because of their more narrow, organizationally-specific view of what it meant to collaborate:

“...They come at it with their own issues, with their own concerns... they’re too busy looking at their own patch and not looking at the big picture... This was a negotiation process.” (Snowy-Monaro)

Some Snowy-Monaro participants believed that the planning process divided participants more than it united them. This sentiment was emphasized mostly by RFS volunteers:

“If anything...I’d say [the planning process is] just another nail in the coffin if you ask me.” (Snowy-Monaro)

Participants went on to express the intractability of the conflict saying “...*They’ve always argued and they will continue to argue*” (Snowy-Monaro) and suggested that mandating the planning process will not resolve differences:

“Yeah...there is always going to be conflict when you get different agencies in. You might discuss it and just because you want to do such and such a thing doesn’t mean the other side is going to want to do it that way.” (Snowy-Monaro)

Acknowledging the challenging relationships, some Snowy-Monaro participants framed the process more optimistically:

“I don’t think you should look at it as a negative. I think you should look at it as a positive and see what you can achieve out of this, and if you can’t achieve it this time, then you make sure you do it next time.” (Snowy-Monaro)

In contentious contexts “success” may be viewed as a long term process rather than an immediate outcome of CEP. However, because NSW bushfire planning is a recurrent process, small progress and new relationships may enhance the potential for improved inter-organizational networks in the future.

Conclusion

Policy-makers in NSW, Australia met the trans-boundary complexity of bushfire with a legislative-mandate for collaboration that was designed to create an inter-organizational, landscape-level bushfire plan. This research demonstrates that such a legislative mandate can ‘burn through’ organizational boundaries to foster inter-organizational communication, but in ways that are modified by contextual factors and time. However, in groups with a history of conflict, planning mandates may have limited,

and by some measures, negative effects on inter-organizational communication networks. Furthermore, efforts to institutionalize collaboration may be intrinsically biased towards placing administrative power and influence with public agencies. Though representatives for public-land agencies were the most influential across all groups, they largely avoided commenting on management outside of their tenure boundaries. In this way, the participants maintained a conservative view of individual agency policy and authority despite state-level policy calling for a 'tenure-blind' approach. The bushfire planning framework also fueled this predisposition towards public-land agencies and lack of influence by non-land managers by making assets on the landscape the focal point of planning. Ultimately, boundaries will not be overcome by planning processes that reinforce pre-planning network divisions. The plan may be completed, ecological scales spanned, but interests will not be integrated and it may be difficult to achieve larger-scale landscape management goals.

Policy-mandated collaborations may produce more consistent social network outcomes by creating a structure flexible enough to accommodate local political, social, and ecological contexts. We must be careful not to view network structure as simply a pre-cursor to collaboration, but an effect of local context, dominant discourses about natural resource management, and basic difference between players. In a reoccurring CEP such as the NSW bushfire planning process, policy-makers should be aware that one negative planning process may threaten the viability of future efforts (Imperial 2005). Further, in situations where central authorities supply standardized templates, planning frameworks should enhance the relational aspects of planning to encourage periods of

open dialogue, joint goal setting, and opportunities for conflict management. This is not to propose that group should each invent their agenda from scratch; research has shown that mandated collaborations need to be supported by additional governance mechanisms such as top-down rules (Rodriguez et al. 2007). Policy mandates can set specific and achievable planning objectives for the groups to guide planning on the local level.

Just as important as acknowledging each unique planning context is recognizing the potential limitations of CEP. Many groups may not be amenable to the social engineering that policy-mandates may hope to accomplish; there are significant barriers – such as inconsistent missions, budgetary responsibilities, resource limitations (Imperial 2005) – that a mandate may not overcome. Thus, many scholars caution against forcing collaborative process where there is a high likelihood of failure (Gray 1989; Imperial, 2005). However, with wildfire planning, collaboration is vital to protect lives, infrastructure, and natural resources. Policy-makers may not have the luxury of exercising discretionary caution about when and where to mandate collaboration. Again, maintaining contextual flexibility in the policy will allow groups who are capable of pushing the boundaries of their organizations to innovative and highly contentious groups to identify mutually-agreeable actions directed towards achieving the policy-defined planning objectives that can be built upon in future planning efforts.

Despite the relative rigidity of the NSW bushfire planning process, there are many aspects of this inter-organizational mandate that seem to be working well and providing benefits to participating organizations. The policy creates a formal and reliable forum for interaction that may not otherwise occur; while this may not lead to transformation of

wildland fire management, it does lead to the creation of a strategic, action-oriented plan in areas that are susceptible to potentially devastating bushfires. Additionally, the 5-year plan renewal promotes maintenance of inter-organizational ties on a longer time-scale and gives groups repeated opportunities to build communication networks.

This study contributes to international discussions on sustainable wildland fire policy by highlighting that CEP has measurable effects on inter-organizational wildland fire communication networks. In an issue as contingent upon inter-organizational coordination as wildland fire management, considering the impact of policies on relationships is not simply an added benefit, it is a necessity. Policy-makers should not only explicitly investigate the potential impact of any policy on relationship-building across boundaries, but also make cross-boundary relationship-building a policy goal. My research suggests that mandating collaboration may be one effective policy strategy, but also may have unintended and sometimes negative consequences on relationships. Ultimately, relational outcomes will be colored by local social and political history, personality and leadership, and ecological context. Regardless of the substantive context of mandated collaboration, policy-makers have the challenging task of balancing flexibility to accommodate local context, with governance mechanisms that provide administrative support and political guidance.

Chapter 3 - Co-constructing the Fire Environment: Risk Planning, Conservation, and the Creation of Governable Landscapes

Introduction

Understanding the Fire Environment as Social and Natural

Perhaps in no other context is the interconnectedness of social and natural systems so tangibly prominent than in the case of humans and wildland fire. Both historic and contemporary examples illustrate the influence of social systems on the natural fire environment. For example, scholars broadly accept that fire regimes across the globe have been shaped by human fire-use (Pyne 2001; Bowman et al. 2009). However, social management of the fire environment became problematic in 20th century United States when a century-long fire suppression policy contributed to the build-up of ‘fuels’ on the landscape, leading to more destructive fires (Busenberg 2004; Stephens and Ruth 2005). Similarly, anthropogenic climate change in Australia has become a primary factor in explaining increases in wildfire occurrence and severity (Pitman et al. 2007; Hasson et al. 2009; Liu et al. 2010). However, social systems are influenced *by* the natural fire environment just as they influence *towards* the natural fire environment. For example, wildland fire can catalyze both conflict and cohesion within human communities (Carroll et al. 2005). Similarly, ‘fire-adapted’ is no longer reserved for biophysical systems: the term ‘fire-adapted human communities’ is used to describe human communities as increasingly resilient, self-sufficient, and knowledgeable as they interact with wildland fire (QFR 2009). However, simply saying that social affects natural or vice versa does not reflect the complexity of the system; wildland fire is a dynamic phenomenon where

social and natural are co-influential and co-produced. As an example, wildfires occurring at the border of fire-prone wildland areas and human-developed areas known as the Wildland-Urban Interface (WUI) have increased perceptions of wildland fire as a destructive force, socially-incompatible with expanding human development. However, human presence in the WUI actually increases fire frequency due to human-caused ignitions (Syphard et al. 2007). This increased fire frequency may affect ecosystem structure, alter fire regimes, and lead to local extinction (Syphard et al. 2007), as well as reinforce the social perception of fire as incompatible with human systems. Thus, boundaries between ‘social’ and ‘natural’ in wildland fire systems are continually changing and obfuscated.

Despite attempts for integration of social and natural systems, some question the way scholars draw boundaries between ‘the social’ and ‘the natural’ in sociology and conservation biology (Irwin 2001; Murdoch 2001; Berkes 2004). While many conservation biologists recognize that social systems are inextricably intertwined with the natural environment and use concepts of socio-ecological systems or coupled human-natural systems to model this complexity (e.g. Geist and Galatowitsch 1999; Holmes et al. 2001; Berkes 2004; Folke et al. 2005), others operate with an under-theorized, reductionist view of social systems (Brosius 2006). On the other hand, scholars argue that sociology has overemphasized the social by neglecting the critical influence of the biophysical environment, leading to “human exemptionalism” where the social is viewed as removed from the natural (Catton and Dunlap 1978; Goldman and Schurman 2000; Irwin 2001; Murdoch 2001; Demeritt 2002). The compulsion to draw boundaries between

social and natural is partly a relic of academic history; early epistemic communities sought to lay claim to their field of inquiry by emphasizing differences (Goldman and Schurman 2000; Lamont and Molnar 2002). On a cultural level, however, humans construct symbolic boundaries to order their environment, understand reality, and to ultimately foster a sense of control across boundaries (Ashforth et al. 2000; Lamont and Molnar 2002; Folke et al. 2005).

Wildland fire planning is a multi-faceted effort to manage both social and ecological aspects of the fire environment. Planners may create fire plans to influence fuel loads and promote ecological benefits through prescribed burning projects, to create education campaigns to encourage homeowners readying their property for fire, or to organize joint suppression responses (Jakes and Nelson 2007; Grayzeck-Souter et al. 2009). In line with calls for enhanced coordination (Hann and Bunnell 2001; Dombeck et al. 2004), policy-makers in the US and Australia have mandated collaboration in wildland fire planning to facilitate coordination across agencies, the inclusion of local communities in fire planning, and landscape-level management.

In this paper, I examine the co-construction of the fire environment within collaborative bushfire planning in New South Wales, Australia by investigating how planning groups construct their concept of the natural environment, and in turn, how that construction influences planning approaches. I specifically explore how groups manage tensions between conservation and hazard reduction management objectives, which scholars identify as a central challenge of wildland fire management (Dellasalla 2004; Steelman and Burke 2007; Gill and Stephens 2009) since frequent prescribed burning

may contribute to hazard reduction, but may also reduce biodiversity (Gill 1981; Whelan et al. 2003 *cited in* Whittaker and Mercer 2004). This research strategy also provides opportunity to explore broader discussions concerning tensions between natural and social systems due the complexity inherent in managing fire-prone landscapes for multiple, sometimes conflicting objectives. For example, fire planning for biodiversity conservation and hazard reduction may lead groups to ask: What is a natural fire regime for this area? Or, why shouldn't social protection come before ecological interests? Often, planners return to the conversation that 'natural' in fire systems does not necessarily exist outside the realm of 'social' and vice versa.

Co-construction and the Fire Environment

Scholars present the theoretical framework of co-constructionism – based on the co-influence and co-production of natural and social systems – in response to the persistence of the society/nature divide in academia and Western culture (Irwin 2001; Murdoch 2001; Hannigan 2006). Co-construction has emerged from social constructionism, a theory that emphasizes the role of social, cultural, and political processes in shaping how we understand the environment, environmental problems, and potential solutions (Hannigan 2006). Social constructionist theory does not necessarily preclude a material understanding of nature and environmental problems, but acknowledges the role of social processes in the interpretation of nature. Co-constructionism builds upon social constructionism by also recognizing how biophysical systems shape social systems. To a certain extent, co-construction represents a reconciliation of social constructionist and realist approaches to understanding the

environment (Hannigan 2006) as well as an attempt to bridge social and ecological fields of inquiry. Within co-constructionism, one may think of nature and society as being “effectively coproduced through reciprocal and symmetric interplay of the social and the physical” (Pickering 1996). Thus, people may ‘construct’ the natural environment through language and public discourse, through defining and framing environmental problems in particular ways, through scientific methods and analysis, and through personal experience. However, these constructions are also influenced by biophysical aspects of natural systems such as the occurrence of natural events, through experiencing and interpreting landscapes, and through facing ecological constraints and opportunities, all of which, again, may be influenced by social forces.

A number of studies in aggregate contribute to our initial understanding of the co-influence and co-production of social and natural aspects of the fire environment. Research on public discourse¹ highlights the emergence of various social constructions of the fire-prone environment (e.g. Burns and Cheng 2006; Champ et al 2009). Whittaker and Mercer’s (2004) work provides an important Australian study of the emergence of constructions about bushfire and nature out of the 2002-2003 Victorian Bushfires. They identified three dominant discourses, each which drew upon a different construction of the natural fire environment. The *conservationist* discourse saw bushfires as “natural and inevitable” and as vital to the landscape. These parties de-emphasized the role and influence of agencies and individuals on bushfires. This was contrasted with a *ruralist* discourse that characterized fires as “unnatural and avoidable”. Ruralists most often

¹ A discourse is “a particular way of talking about or understanding the world (or an aspect of the world)” (Phillips and Jorgensen, 2002).

attributed these “unnatural” fires to mismanagement and epistemological marginalization practiced by public land agencies. The final *wise use* discourse had some overlap with the ruralist discourse, but came out of concern for maintaining recreational, extractive, and commercial interests. Wise use discourses argued that “locking up” public land, environmentalists, and environmental regulations were to blame for bushfires. Of particular relevance to fire managers and to this research is that each of these discourses also constructs a different view of what constitutes ‘appropriate’ fire management.

The studies above took primarily social constructivist approaches by examining how social and political processes influence the discursive construction of the fire environment. However, in line with co-constructivist theory, others have investigated the role of the biophysical environment in construction of the social fire environment. For example, the physical experience of wildfire can shape constructions of nature, as well as influence social systems by catalyzing conflict and/or fostering greater social cohesion (Carroll et al. 2005). Thus in addition to social and political factors, ecological conditions and personal experiences of the natural fire environment provide further explanation for the emergence of different co-constructions of the fire environment.

Research Focus and Questions:

In this paper, I investigate the co-construction of the fire environment within collaborative bushfire planning groups in New South Wales, Australia, focusing on:

- Co-constructing ‘the natural’ in fire planning: Through what means and processes do planning participants co-construct the natural fire environment during

collaborative planning? What are the characteristics of the jointly-constructed natural fire environment?

- Co-constructing ‘the social’ in fire planning: How do constructions of the natural fire environment influence the planning process, views towards fire management, and proposed planning actions and emphases? Additionally, how do features of the natural environment –particularly biodiversity – influence planning emphases?
- Risk in the fire environment: What is the role of risk in the co-construction of the fire environment in bushfire planning groups? In particular, I explore risk management as an organizing element of the co-construction process.

Examining these co-construction processes will help deconstruct both how planning participants understand the natural and social fire environment and the potential implications of those views for fire management more broadly.

Research Context

The Australian state of New South Wales (NSW) is located in the southeast of the continent, to the north of Victoria and the south of Queensland (Figure 2). Like the Australian continent itself, NSW contains a diversity of ecological communities, many of which are very prone to wildland fire². NSW has a record of large bushfires both historically and contemporarily and approximately 20 percent of NSW fire seasons are considered to be “severe” (Pyne 1991).

² I conducted the bulk of this research between April and August 2008, prior to the high-profile 2009 Black Saturday bushfires in Victoria, bordering NSW.

The 1997 Rural Fires Act is the primary state legislation regarding bushfire management in NSW. There was no federal bushfire policy at the time this paper was written. In addition to setting a number of regulatory policies relating to fire suppression, prevention, and fire-safe building code enforcement, the Rural Fires Act created Bush Fire Management Committees (BFMCs) charged with overseeing and coordinating bushfire operations, management, and planning activities in rural fire districts. The Rural Fires Act delineates the boundaries of BFMCs and designates a diverse membership, including representatives from organizations such as the Rural Fire Service, municipal or shire government, NSW State Forests, NSW National Parks and Wildlife, state rail, police, Aboriginal land management, and the NSW Nature Conservation Council. At the time of the study, the NSW Rural Fire Service (RFS) – which oversees the implementation of the Rural Fires Act – had developed and was piloting standardized bushfire planning software and process for use by BFMCs. The Rural Fires Act mandates each BFMC to collaboratively produce a Bush Fire Risk Management Plan (BFRMP) every five years. I conducted three case studies of these collaborative bushfire planning processes (Figure 2).

Murrumbidgee Irrigation Area Zone

The Murrumbidgee Irrigation Area (MIA) is primarily an agricultural region in southwest NSW, comprised by four local government areas with a total population of 45,640. The town of Griffith (population 16,182) is a regional center, while the other three local government areas are smaller and more disperse. Most of the planning area's 10,432 km² are privately-owned, with some publically-owned natural grassland, swamp,

and river red gum forests managed by NSW State Forest, NSW Department of Lands, and NSW National Parks and Wildlife. There is no pattern of frequent or large fires in the MIA, thus the area is considered to be at relatively low fire risk.

Illawarra Zone

Just south of Sydney, the Illawarra is a coastal region typified by an escarpment that runs north-south the length of the planning area. The 1129.3 km² area contains three local government areas and 271,500 residents. Below the escarpment is largely developed urban and agricultural areas, but the plateau is covered by fire-sensitive rainforest and dry sclerophyll forests. One bushfire complex of note was the Black Christmas fire in 2001 and early-2002 that burned areas in the north of the planning area, including parts of the Royal National Park, as well as the publically-managed Sydney Water Catchment Authority, which is a source of drinking water for Sydney. Municipal government, mining companies, electricity providers and the NSW Roads and Traffic Authority manage much of the rest of the planning area.

Snowy-Monaro Zone

The Snowy-Monaro zone lies between the southern border of the Australian Capital Territory (ACT) and the northern border of Victoria in south-central NSW. The planning area of 11,259 km² has a relatively diverse landscape ranging from agricultural grazing lands to wet and dry sclerophyll forests to unique alpine and sub-alpine ecosystems. The zone contains two local government areas with a total population of approximately 17,000, as well as most of NSW's largest National Park, Kosciuszko. The

area is considered quite high in fire risk, in part due to the 2002-2003 Great Divide bushfires, which burned significant portions of the National Park and adjacent private lands, consequently destroying many structures and livestock. The NSW National Parks and Wildlife manages over a quarter of the planning area and NSW State Forest maintains several pine and eucalypt plantations for timber production. Private land-owners manage much of the rest of the zone.

Methods

Interviews and Document Review

I used a multiple case study, mixed method approach to examine the processes through which bushfire planning groups co-constructed their fire planning environment, as well as the impact of that construction on their planning and management emphases. The primary source of data was 44 in-depth, semi-structured interviews conducted with participants from each of the three planning groups (MIA=11, Illawarra=12, and Snowy-Monaro=21). I interviewed as many participants as possible, focusing on representing a diversity of organizational representation and prioritizing those that were most active according to meeting attendance and identification by the process facilitator and other planning participants. The interview guide was structured to understand the planning context, process, and outcomes (Appendix 2). I recorded all interviews (ranging between 40 – 120 minutes), which were then transcribed verbatim and checked by a second transcriptionist. Using NVivo 8, I coded interview text for themes related to conceptions of the fire environment, biodiversity, and fire risk.

Additionally, I completed a review of several documents, including the BFRMP that each group produced, an in-depth handbook created by the RFS to guide groups in their planning, as well as several policy documents and statements produced by the state-level Bush Fire Coordinating Committee. Again, I focused on the processes through which groups and policies co-constructed the environment, how they planned for biodiversity, ecosystem function, and reducing fire risk, as well as the management actions proposed.

Review of Available Biological Data

To examine the potential impact of biophysical features on the social planning environment, I compiled species richness data from the Atlas of NSW Wildlife (NSW DECCW 2010a) for each of the three planning areas in this study. The Atlas is publically-accessible database managed by the NSW Department of Environment, Climate Change, and Water (DECCW). The database includes information on sightings, locations, and conservation status (e.g. threatened, endangered, not protected) of NSW flora and fauna that is compiled from submissions by the general public, DECCW staff, biodiversity surveys, consultants, and historical reports. All records are reviewed by DECCW before entry in the database. The Atlas includes “sightings of plants, mammals, birds, reptiles, amphibians and endangered invertebrates (such as insects and snails)” and “does not contain records of fish, or invertebrates unless they are listed under the Threatened Species Conservation Act.” (NSW DECCW 2010a). The DECCW emphasizes that data is often patchy and should not be used for abundance analyses. However, it is the most complete, publically-available NSW wildlife database.

I examined species richness as a basic biodiversity measure in each planning area as it was the most appropriate metric for the data available. I compiled three different species richness lists for each of the planning areas: 1) total species richness, 2) threatened species richness, and 3) fire-sensitive threatened species richness. I searched the Atlas flora and fauna databases according to Local Government Areas (LGAs), limiting data output to species recorded since 1980 to gain a robust and relevant list of species. For a complete and non-repetitive species richness count, I manually cross-checked species lists for each LGA so that a given species was counted only once for a planning area. To determine whether the threatened species for each planning area was sensitive to fire, I evaluated the “threats” listed under the NSW threatened species profile database (NSW DECCW 2010b). I considered a species to be “fire-sensitive” if it was listed in its species profile as being threatened by “too frequent fire”, “inappropriate fire regimes”, or “intense fire”.

Results and Discussion

Wildland fire management is a socially and ecologically complex issue. Accordingly, I found that planning groups were guided in their co-construction of the fire environment through several structural elements, including a policy that sought to protect assets on the landscape from fire and a risk-based planning template that strived to construct a socially and ecologically governable landscape. The concept of risk, in particular, was an integrative element in planning and ultimately the context through which groups co-constructed the fire environment. To facilitate organization, I discuss

the results by first exploring the co-construction of the natural, and second exploring the co-construction of the social. Further, I examine the concept of risk as an important organizing feature of the co-construction process throughout. Figure 4 provides a conceptual synthesis of the findings.

Co-constructing the Natural Fire Planning Environment

Risk was the primary lens through which participants co-constructed the natural fire environment (Figure 4). All NSW groups used a standardized risk assessment template for planning that was created by professionals at the central office of the NSW Rural Fire Service and the Bushfire Coordinating Committee. As written in state-level policy, the purpose of a BFRMP is to “minimize the risk of adverse impact of bushfires on life, property and the environment” (Annex B to BFCC Policy 1/2008, p. 9). A traditional concept of risk incorporates the probability of a particular event occurring with the potential adverse impacts of that event (NRC 1996). However, risk is a social construct in itself and can inform how one views nature. As Dean writes “Risk is a way – or rather, a set of different ways – of ordering reality, of rendering it into a calculable form.” (1999, p. 177).

The BFRMP was a spatially-explicit process focused on the production of maps to guide and focus planning. Thus, the primary means through which participants co-constructed their environment was through the digital construction of planning area GIS maps, the focus of which was assets mapped using the Risk Register, an RFS-designed planning software. Within the framework of a basic qualitative risk analysis, participants identified four categories of assets, which policy outlined as “anything that is valued by

the community” (Annex B to BFCC Policy 1/2008 p. 33): (1) human settlement assets, which were residential, (2) economic assets, which could be “agricultural, commercial/industrial, infrastructure, tourist and recreational, mines, commercial forests, and drinking water catchments”, (3) environmental assets, which were threatened, fire-sensitive, or locally-significant species or ecological communities, and (4) cultural assets, most often Aboriginal heritage or non-aboriginal heritage sites. Risk assessment included determining likelihood and consequence of fire towards each asset aided by the Risk Register. Thus, participants constructed a fire environment that they understood as a collection of assets under varying levels of bushfire risk, from low to extreme.

Participants internalized the concept of the ‘fire environment as assets’ promoted by state-level bushfire policy documents and the risk planning template. Organizational representatives – including those with little or no previous fire planning experience – pervasively used the language of “assets” and “treatments” to describe the environment, management actions, other participants’ interests, and their own organizations concerns:

“[I have a] better understanding of each stakeholder’s requirement to protect their assets in their own way. And [I] have [an understanding of] some potential conflict between the treatments for each stakeholder...but I think everyone [is now] more aware of each others’ duty to protect their assets and how we go about it.” (Illawarra)

In this way, risk acted as a common language and allowed representatives to understand diverse landscapes within a standardized framework. However, this risk framework also

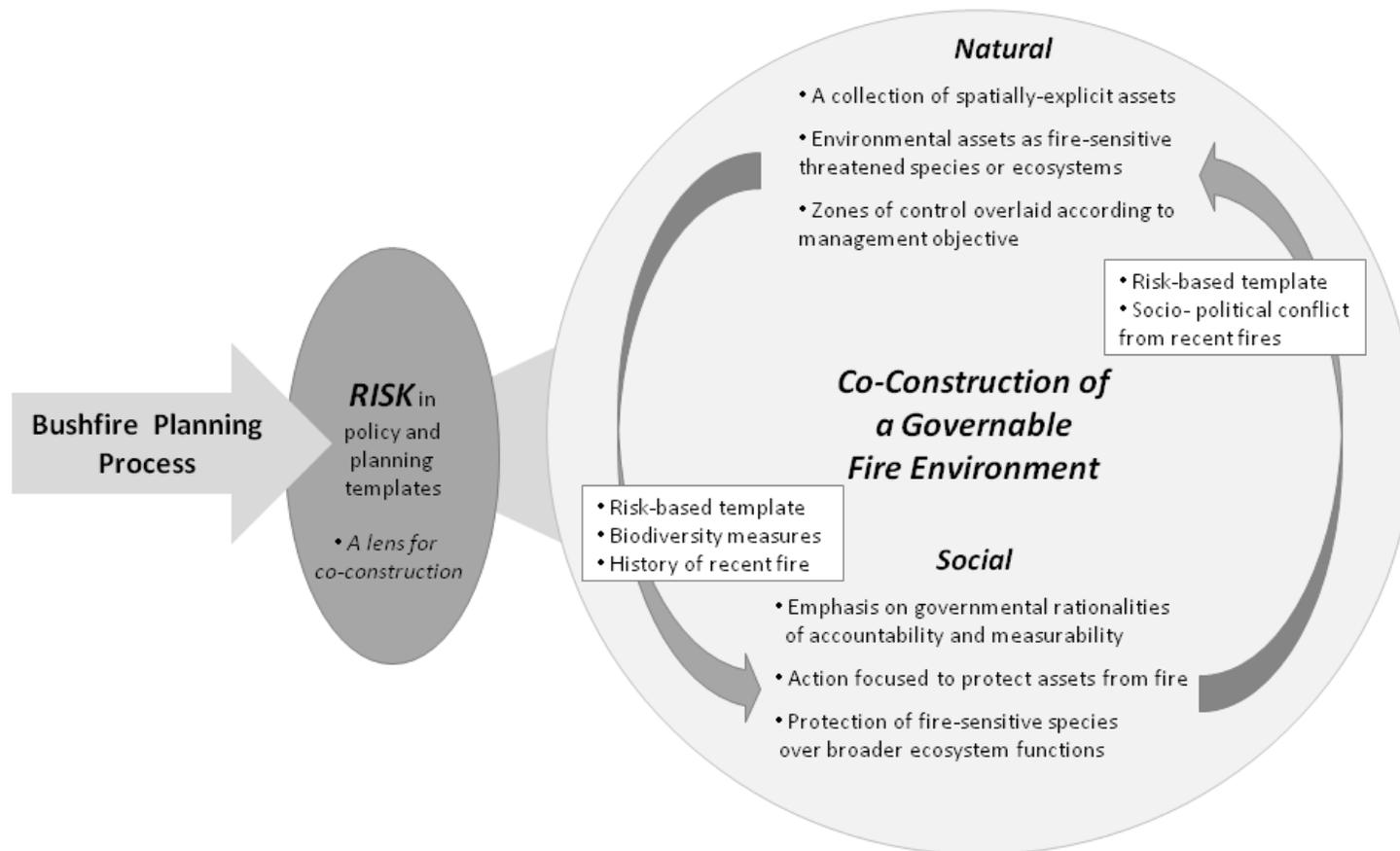


Figure 4. Conceptual model for the study results: risk acts as a lens through which bushfire planning groups co-construct a governable fire planning environment.

fostered a particular, perhaps limited co-construction of the natural environment based upon assigning social value and risk estimates to features of the fire environment.

Though planning groups considered multiple facets of the fire environment, this paper closely examines how they considered conservation and ecological processes during planning. As touched on above, the primary means through which planning groups considered the conservation of environmental features was through the identification of environmental assets as “threatened or locally important species, communities, habitats, wetlands or littoral rainforests on which bushfire may potentially have an impact” (Annex B to BFCC 2008/1, p. 63). The NSW Department of Environment, Climate Change and Water (DECCW) provided spatially-explicit environmental data from the Atlas of NSW Wildlife (the Atlas), a database of recorded sightings of flora and fauna that covers the entire state of NSW (see pg 89-90 for details). Thus, data from the Atlas represented the natural environment as it was considered within planning.

Consideration of minimum fire thresholds was one way groups addressed environmental processes; this feature led participants to construct a natural fire environment that was more complex and dynamic than it would have been without. Fire thresholds were based on the ecological concept of a fire regime, which describes fuel type, temporal nature, spatial pattern, and certain consequences of fire (Bowman et al. 2009). Participants were provided thresholds for ecologically-appropriate fire frequencies for each NSW vegetation type within the planning template. Since fire thresholds were standardized within state bushfire planning policy, they acted as points of leverage for balancing fire hazard reduction and ecological objectives across groups. In particular,

participants concerned with conservation described fire thresholds as an important tool for reigning in what they saw as too-frequent burning coming out of concern for hazard reduction:

“So we would be more taking a perspective where....you’re trying to minimize the impact to conservation where they’re trying to maximize risk management. They don’t have to manage for conservation. That’s not in their charter. We use... [the thresholds], the level of sensitivities for those different communities as a basis [for leverage in planning]. It’s our little tool.” (Snowy-Monaro)

Additionally, many emphasized that the inclusion of fire thresholds was the primary manifestation of ecological research in the planning process.

Participants also ordered their fire environment by overlaying various categories of Bushfire Management Zones on the planning area (Table 6), each of which indicated a particular management objective, arguably at the detriment of others. For example, Asset Protection Zones (APZs) were placed in areas where the group sought to do more intensive hazard reduction (mechanical thinning, mastication, or vegetation clearing) to protect assets, perhaps at detriment of ecological values and biodiversity (Stephens and Gill, 2009). Conservation-oriented participants acknowledged this tradeoff:

“Yeah [APZs] can obviously have impacts on biodiversity. We do have to look at that when we establish them but really the bottom line is you are putting that in to protect those assets. You might make informed decisions about threatened species being there but at the end of the day it is going to be the social considerations that prevail over biodiversity.” (Illawarra)

Alternatively, Land Management Zones (LMZs) were generally viewed as areas where ecological processes and biodiversity were emphasized over hazard mitigation. Thus, BFRMP groups spatially-segregated fire management objectives (hazard mitigation, biodiversity conservation, suppression) on the landscape, constructing a fire environment simplified and categorized by planning objective. Folke et al. (2005) contend that we often seek to simplify landscapes to reduce uncertainty and enhance control over natural resources. Certainly, through applying specific management zones, policy-makers and planners sought to create a more predictable and controllable fire environment.

Table 6. Fire zoning categories and management intentions used in the bushfire planning process.

Fire Zoning Category	Fire Management Emphasis
<i>Asset Protection Zones (APZs)</i>	Hazard reduction/protection of life and property: zoned around assets that were close to bushfire hazards.
<i>Strategic Fire Advantage Zones (SFAZs)</i>	Hazard reduction/fire suppression: placed in areas of strategic importance for suppression that would undergo hazard reduction treatments to slow bushfires.
<i>Land Management Zones (LMZs)</i>	Conservation/ecosystem function: Placed in areas that were not close to sensitive assets and were less intensely managed for hazard reduction.

Co-constructing the Social Fire Planning Environment

Closing the loop of co-constructionist theory, here I examine how the natural environment co-constructs and influences the social planning environment in terms of proposed planning approaches and management emphases. In particular, I investigate the

influence of the ‘natural fire environment’ both in terms of the one constructed during planning and the ‘actual’ environment as represented by biodiversity data.

The risk management framework was a lens through which participants both constructed the natural fire environment *and* which influenced participants’ ideas of socially-appropriate management of those assets (Figure 4), the latter of which is the focus of this section. Planning groups framed the material environment as a collection of assets that could be protected from destructive bushfire through physical interventions such as hazardous fuel reduction and educational interventions in community outreach. This approach reinforced governmental rationalities by promoting efficiency, accountability, and strategic management. However, previous research and participants themselves questioned the efficacy of such interventions in reducing fire risk. For example, participants consistently discussed the complacency of local residents in response to outreach efforts, calling into question the potential success of community education as a ‘treatment’ to motivate action or behavior change.

“I’d say public interest is a graph which tapers off directly with year or time since the last significant fire....But I think at the moment, people are not interested at all.” (Illawarra)

Previous research also raises questions about prescribed burning as a ‘treatment’ to reduce fuels and minimize risk to assets. Ecological studies suggest that the effectiveness of fuel reduction burning in some Australian forests may be limited to 3-5 years (Simmons and Adams 1986), that frequent fuel reduction burning may reduce biodiversity (Gill 1981), and that such burning can actually stimulate growth and increase

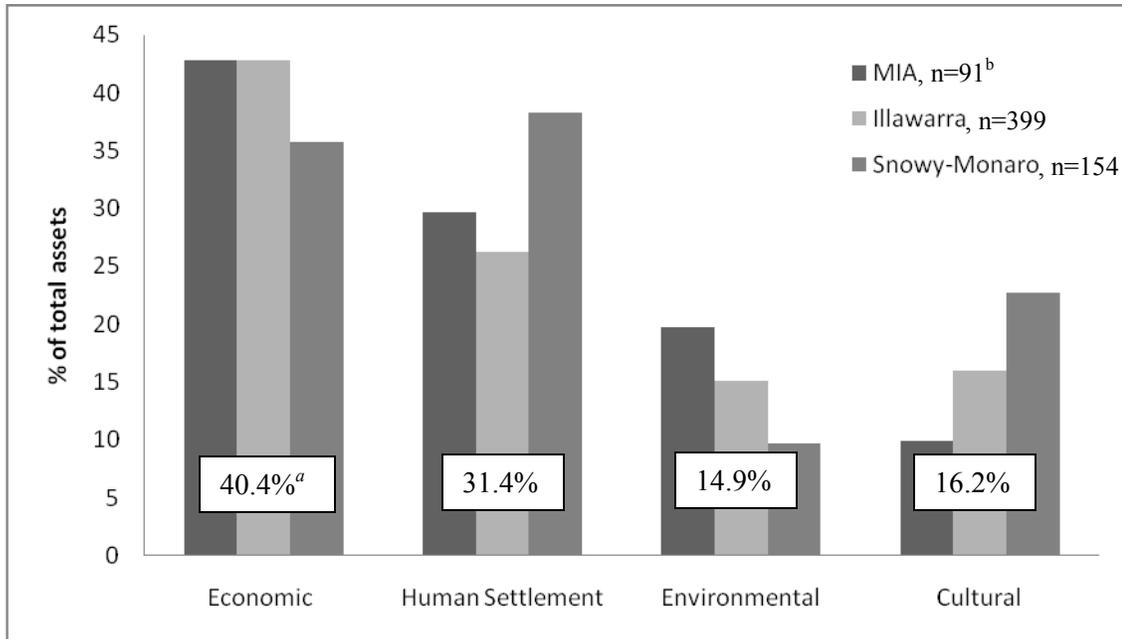
fuels (Fernandes and Botelho 2003). As Whelan et al. (2003) comment “More extreme hazard [or fuel] reduction in forests will not guarantee protection from fires in severe conditions, but will threaten biodiversity” (*cited in Whittaker and Mercer, 2004*). Thus, the risk management formula of ‘identify asset, estimate risk, assign treatment to minimize risk’ promotes a social planning environment where action is favored over inaction, though the efficacy of some actions are questioned both by relevant research and participants themselves.

Though planning groups considered four asset categories in their risk assessment, they identified environmental much less frequently than economic and human settlement assets. Environmental assets comprised an average of 14.85% of assets identified across groups, while economic assets represented 44.45% of the total assets (Figure 5). While one may not expect equal distribution of assets across categories (i.e. each category representing 25% of the total assets), the disparity between environmental assets and economic assets and the fact that environmental assets consistently represented the smallest category across groups supports the claim that environmental assets were under-emphasized the bushfire risk plan. Participants reinforced the argument that the under-emphasis was due, at least in part, to the planning template:

“...The nature of these plans makes it difficult to achieve the protection and maintenance of biodiversity values.” (Snowy-Monaro)

Based on these findings, I argue that the risk framework was better suited to addressing instrumental social values than biocentric environmental values. More broadly, this

finding suggests that risk-based approaches to environmental management will tend to privilege immediate life and property protection over longer-term environmental values, particularly when there is urgency associated with the system at hand, as with bushfire.



^aIndicates the mean percentage that each asset category represents across case studies.

^bn equals the total number of assets identified by each planning group.

Figure 5. Percent of total assets that each of the four asset categories represent in the Bushfire Risk Management Process both within groups and across groups.

Despite the limited emphasis of environmental assets, this research supports a co-constructionist view of fire planning where humans are not exempt from the natural environment, and depending on the social and ecological context, biophysical features such as bushfire events and biodiversity influence the social management of the fire environment. For example, in two planning groups, the number of environmental assets identified in the plan was proportional to the ‘actual’ level of biodiversity as measured by

species richness (e.g. total species richness, threatened species richness, and fire-sensitive threatened species richness³). Based on estimates from the Atlas, the MIA group had the lowest species richness in all categories and also identified relatively few environmental assets in their planning document (Table 7). Similarly, the Illawarra group identified the most environmental assets in their planning document and had the highest species richness measures (Table 7). Since these planning groups' identification of environmental assets varies according to biophysical measures of biodiversity, the co-constructionist model holds for these two planning groups. In the Snowy-Monaro group, additional factors such as history of recent fire (a biophysical driver) and conflict between organizations mediated the co-construction of the social fire planning environment. Relative to the other planning groups, Snowy-Monaro had moderate species richness levels, but the planning group identified the lowest number of environmental assets of any of the case studies (Table 7). Strong social pressure emerging from the fallout of a destructive fire promoted the Snowy-Monaro group's limited consideration of environmental assets relative to species richness calculated from the Atlas. One National Parks representative, responsible for upholding the agency's biodiversity protection charter, acknowledged the social pressure to favor life/property protection over conservation objectives:

³ Animal species represented the greatest proportion of fire-sensitive threatened species across case study groups (Table 2). Many of the fire-sensitive animal species were birds such as the Glossy Black Cockatoo (*Calpytorhynchus lathami*) or the Barking Owl (*Ninox connivens*), which were listed as being threatened by "too frequent fire" (DECCW 2010b). However, several marsupial species such as the Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*) were listed as being threatened to "too intense fire" or "too frequent fire". Plant fire-sensitive threatened species were less common within each planning area and species did not overlap across planning areas. Thus, the fire-sensitive threatened plant species were most likely regionally endemic.

“...We can't argue 'no' [to hazard reduction burning] any more. It's kind of suicide politically.” (Snowy-Monaro)

Thus, the biophysical reality of a recent fire in Snowy-Monaro contributed to the construction a social planning environment where hazard mitigation was privileged over conservation values.

Table 7. Environmental assets identified and species richness measures for each bushfire planning group planning area.

	MIA	Illawarra	Snowy-Monaro
<u>Environmental Assets^a</u>	<u>18</u>	<u>51</u>	<u>15</u>
<u>Total Species Richness^b</u>	<u>1513</u>	<u>2234</u>	<u>1597</u>
<i>Animal Species Richness^{b, c}</i>	377	523	338
<i>Plant Species Richness^b</i>	1136	1711	1259
<u>Threatened Species Richness^b</u>	<u>52</u>	<u>110</u>	<u>81</u>
<i>Threatened Animals^{b, c}</i>	42	80	50
<i>Threatened Plants^b</i>	10	30	31
<u>Fire-Sensitive Threatened Species Richness^b</u>	<u>20</u>	<u>46</u>	<u>40</u>
<i>Fire-Sensitive Threatened Animals^{b, c}</i>	18	22	28
<i>Fire-Sensitive Threatened Plants^b</i>	2	24	12

^aAs identified in the BFRMP documents.

^bCalculated from the NSW Atlas of Wildlife (NSW DECCW 2010a).

^cAnimal species richness measures include records of all vertebrate species, as well as threatened invertebrate species.

Maintaining a risk-based view of the fire environment also encouraged groups to choose management actions focused on protecting fire-sensitive species as points on the map, rather than considering broader ecological processes such as forest reproduction,

nutrient cycling, and biodiversity conservation goals across the landscape. Specifically, the risk-process model was designed to minimize the risk of fire to spatially-explicit assets through targeted interventions. However, the rather narrow definition of environmental assets and associated treatments did not capture more intangible ecological values. As one planning participant put it:

“It’s hard to put ecological integrity as a point on the map” (Illawarra).

Participants further questioned whether the format of asset identification, risk assessment, treatment identification was appropriate for the risk management of environmental assets. For example, participants noted that it was not prudent to continually reduce fuels around the habitat of a fire-sensitive threatened species in hopes of excluding fire. Consequently, many argued that it was challenging to allocate treatments to minimize risk to environmental assets:

“It was very difficult to define treatments in the BFRMP for [environmental] aims... and [this] was due only to the nature of this type of plan.”

(Snowy-Monaro)

For this reason, planning groups consistently did not assign treatments to environmental assets, even if they had risk ratings above the group-defined threshold for assigning a treatment. In the MIA group, only one environmental asset out of 10 above the risk threshold was assigned a treatment, while none of the 13 environmental assets above the risk threshold were given treatments in Snowy-Monaro. In fact, environmental assets were the only category above the treatable risk threshold in Snowy-Monaro that were not

assigned a treatment, while they accounted for nearly 70% of all un-treated assets in MIA. The Illawarra group did assign treatments to all assets that were rated as 'high' risk or above, including environmental assets. However, these treatments were entirely focused on facilitating suppression (e.g. maintaining fire trails and ensuring that areas were accessible to fire-fighting equipment) and reducing the potential for ignitions (e.g. limiting recreational access to environmental assets) rather than directly and immediately addressing the risk to these assets.

Though the risk-based process both framed participants' construction of the natural fire environment and their subsequent creation of planning actions to manage that fire environment, the construction of 'natural' and 'social' environments was not a discursive, emergent process as is often described in the literature (e.g. Phillips and Jorgensen 2002; Mercer and Whittaker 2004; Burns and Cheng 2006; Champ et al. 2009). The risk-based template handed-down from state-level fire professionals necessarily mediated constructions of the 'natural' fire environment and 'social' management actions within planning groups. The use of standardized templates and models has been a strong trend in the planning community, but scholars raise concern that planning templates emphasize efficiency over flexibility, innovation, and empowerment of planning partners.

“There could be an assumption that regulators and experts within decision authorities will just have to ‘get on with it’ prompted by statutory requirements and assisted by guidance on how to do it. Indeed, the current participation focus on ‘toolboxes’ or ‘cookbooks’ of procedures and techniques should prompt

concerns about a focus on efficiency rather than on equity and empowerment...”
(Petts and Brooks 2006).

No doubt, the BFRMP template fostered a strategic process that was consistent across groups, transparent, and enabled the prioritization of actions for funding and implementation based on risk ratings. However, where the BFRMP process was strong on providing structure and direction, it was weaker on relational components such as joint goal setting, fostering creative discussion, promoting with innovative approaches to fire management (Brummel Chapter 2). For example, participants noted that planning goals and management treatments were set in the template and thus not negotiated within the group. Further, the planning template focused participants on the creation of a virtual environment through GIS maps, removed from material nature. There were no joint site visits, collaborative walking through the planning area, or viewing of particular asset areas through pictures or images. Consequently, planning groups’ environmental co-constructions were not grounded in joint material experience, which scholars cite as a hallmark of successful collaboration (Wondolleck and Yaffee 2000).

Guided by policy and planning templates, participants co-constructed a governable fire landscape through the bushfire planning process (Figure 4). As Dean writes, “[Risk] is a way of representing events in a certain form so they might be made governable in particular ways, with particular techniques and for particular goals” (Dean 1999, p. 177). By ordering the environment through risk, groups created a socially-actionable environment. Proposed management actions were based on protecting assets, with clear cut and easily prioritized funding, measureable protection objections, and

auditable action. Furthermore, agency administrators desired spatially-linked, strategic, and clear-cut proposed management action (e.g. reduce fuel loads around this housing development). Thus, the risk-based process provided participants with a sense that through management, they could socially-control the natural fire environment. This motivation is a consistent trend within governmental rationalities, and some argue that “The story of government in the twentieth century might be understood as an attempt to find a mode of government able to offer an assurance of the life of the population” (Dean 1999, p. 176). Planning participants also emphasized the political incentive for building clear paths of accountability through auditing, arguing of a history of governmental inquiries, sanctions, and restructuring in response to perceived agency mismanagement following large bushfires:

“...The bottom line in the legislation [is] we’re accountable for delivering this plan. If in three or four years time we get a fire and an audit and this problem, and an auditor is looking at our plan and they could say, “Well how have you delivered what you said you were going to deliver?” And we need to have been effective in that.” (Illawarra)

Indeed, balancing governmental efficiency, life/property protection, and achieving broad ecological management objectives remains a challenge for fire planners, policy-makers and administrators, and for all those living in fire-prone landscapes.

Conclusion

Hajer (1995, p. 15) argues that “Policy-making is in fact to be analyzed as the creation of problems, that is to say, policy-making can be analyzed as a set of practices

that are meant to process fragmented and contradictory statements to be able to create the sort of problems that institutions can handle and for which solutions can be found". In an issue as complex, multi-faceted, and high-stakes as wildland fire management, Hajer's observations are particularly salient. Using a standardized risk template, groups constructed the fire environment and the bushfire problem as 'solvable' or at a minimum 'manageable' through strategic asset protection. This approach was both consistent with current institutional capabilities as well as organizational values of accountability, transparency, and success measurability. Ultimately, using assets as a key feature of planning exacerbated pre-existing biases towards management designed to demonstrate organizational competency in the face of potential public backlash.

Though this research suggests that the risk-based process pushed participants towards a particular co-construction of the fire environment and perhaps an under-evaluated view of ecological conservation values, I do not intend to dismiss its importance or utility for bushfire management. Wildland fire management in an area as fire-prone as NSW is a high-stakes undertaking; there is a critical role for a strategic, cross-tenure bushfire planning effort such as the BFRMP process. Further, the BFRMP process brings together diverse stakeholders to collaboratively create a landscape-level fire plan, which is an innovation in the field of fire management. Rather, I highlight the environmental co-construction explicit within the planning process to evaluate the implications of this worldview for social and ecological aspects of the bushfire system and to identify areas for improvement. In this case, I argue that the risk-based template was a lens through which participants constructed a fire environment that was relevant in

terms of the economic, infrastructural, cultural, and environmental assets it contained. However, the trend towards strategic management of the fire landscape is not a-historical and has been driven by governmental responses to recent destructive fire events. Further, groups identified and treated hazards to economic and human settlement assets more often than environmental and cultural assets, due in part to the risk-based framework, social memory of high-profile fire events, and the shared notion that bushfire is a growing problem in Australia. However, this approach favored the protection of fire-sensitive threatened species (though in practice, often these assets were not seen as ‘treatable’) over broader landscape-level conservation objectives. Protecting ecological values and conservation was often seen as tertiary to, separable from, and in conflict with the primary goals protecting human life and property. However, including concepts such as fire thresholds imbued ecological fire science and ecosystem function into the planning process. Ultimately, this brand of risk management successfully meets institutional goals of delineating paths of accountability for particular actions, promoting transparency in planning to facilitate external auditing, and creating a consistent mode of management across diverse planning areas to assist in prioritization of state funding. Policy-makers, planning participants, and those living in planning areas need to weigh whether constructing this sort of highly-governable fire environment is consistent with stated policy goals and addresses the broader roots of the bushfire problem in an integrated manner.

Regardless of weighing those issues, planning processes such as these may be improved by more explicit consideration of the ways participants co-construct social and

natural systems during planning and by evaluating potential biases in planning processes and templates. Further, bushfire planning may benefit from a more direct grounding in the natural environment through joint site visits, ground truthing of information and data, and creating a collective understanding of what makes their planning area socially and ecologically unique. Like others (Borchers 2005; O’Laughlin 2005), I suggest that the risks of *inaction* towards particular asset or value should also be evaluated if using a risk management process. For example, what is the risk that suppressing bushfire in the habitat of a fire-dependent species will threaten that species through reduced reproduction or altered habitat? Additionally, I suggest expanding the asset-based view of the fire environment to consider broader, more landscape-level ecological goals such protecting water, soil, and air quality, planning for fire-adapted species and ecosystems, and conserving biodiversity on a landscape scale. These values are under-emphasized in the current planning process and constructing the bushfire problem to include them may lead to better fire protection and improved ecological outcomes. Additionally, though policy frames the BFRMP as a strategic endeavor, it is also a cross-organizational process that often acts as an umbrella plan; it is important to consider that the relatively narrow framing of environmental values in the BFRMP may lead to similar definitions in individual agency plans. Ecological and social outcomes may be enhanced by conducting planning with an eye towards the ecological role of fire in the social and natural environment. However, weighing conservation objectives and maintaining an ecological view of wildland fire in landscapes experiencing socially-destructive bushfires will be a continuing challenge.

Chapter 4 - Legislating Collaboration: Examining Governance Modes within Policy-mandated Collaborative Wildland Fire Planning in the Eastern United States and New South Wales, Australia

Introduction

Wildland Fire and Mandated Collaboration

Wildland fire presents a complex governance challenge to policy-makers, land-managers, and those living in fire-prone landscapes. Like water and air management, wildland fire is a trans-boundary phenomenon that does not heed property lines or geopolitical borders (Field and Jensen 2005). However, wildland fire is unique in that it can be both a *hazard* with potentially severe consequences for human life, social well-being, property, and the natural environment (McCaffrey 2004) and a *critical ecological process* for maintaining certain ecosystem structures, features, and processes (Dombeck et al. 2004; Bowman et al. 2010). Furthermore, aspects of the fire system, such as climate (Liu et al. 2010) and patterns of human development (Radeloff et al. 2005) are perpetually changing in ways that can tangibly and unpredictably affect wildland fire regimes. Due to the complexities inherent in the wildland fire system, many scholars and policy-makers now favor flexible governance arrangements for fire management over traditional top-down or ‘one-size-fits-all’ regulatory policies (Busenberg 2004; Dellasalla et al. 2004; Steelman and Burke 2007; Jakes et al. 2011).

Policy-makers in Australia and the United States have incorporated the desire for flexible, decentralized governance of wildfire within ‘top-down’ legislation by mandating collaboration amongst multiple stakeholders in regional wildland fire management plans.

This research examines two examples of legislatively-mandated collaboration in wildland fire planning through an international policy comparative between the United States (US) and New South Wales (NSW), Australia. Though there is a Canadian effort in British Columbia that seeks to foster community wildland fire planning, it exists as a program within the BC Union of Municipalities (BCUoM 2010) rather than within legislation. Further, this program does not specifically require inter-agency collaboration. The NSW Rural Fires Act and the US Healthy Forests Restoration Act are, to my knowledge, the only legislative policies that mandate inter-agency collaboration in local and regional wildland fire planning. Further, Australia and the United States share basic characteristics that serve as an important common contextual basis in this comparative: they are both mostly developed countries with large land bases and a diversity of ecosystems that are prone to wildland fire. Further, the primary areas of wildland fire concern in NSW and the US is in the Wildland-Urban Interface (WUI), where developed areas intermix with flammable vegetation. These two regions also have similarly complex organizational and institutional landscapes relating to the management of wildland fire. Finally, though these policies have parallel wildland fire management goals, they take different approaches to fostering collaboration. This difference provides the theoretically interesting justification for this policy comparative and allows for a side-by-side comparison of distinct approaches to mandating wildland fire planning in similar contexts, with similar policy goals.

Environmental governance describes the suite of both formal and informal structures and processes used to manage environmental systems such as wildland fire.

Within this broad category of governance, however, scholars identify several *modes of governance* that utilize different strategies to achieve broad governance goals. As highlighted in the next section, scholars delineate governance modes into three categories: 1) bureaucratic modes, 2) incentive modes, and 3) network modes. Previous research has shown that the modes of governance used to foster collaborative efforts can influence both the collaborative process and outcomes (Berke 1998; Lowndes and Skelcher 1998; Rodriguez et al. 2007). With this research, I investigate how two policies – the US Healthy Forests Restoration Act (HFRA) and the Australian NSW Rural Fires Act – draw upon these modes of governance in mandating collaborative wildland fire planning, as well as how modes of governance are met and realized at the local level. In particular, I explore the influence of the dominant modes of governance on collaborative wildland fire planning processes and outcomes.

Mandated Collaboration and Modes of Governance

Governance theory distinguishes modes of governance based on multiple criteria, including the mechanisms used to influence actors, the flexibility of governance modes, and the benefits and costs of governance modes. Each of the governance categories presented is an umbrella for multiple modes of governance that share similar characteristics. *Bureaucratic* modes of governance – also described as hierarchies (Thompson et al. 1991; Lowndes and Skelcher 1998) – are rule-based mechanisms, imposed by an authoritative body with goals of coordination, standardization, and enforcement of compliance (Berke 1998; Lowndes and Skelcher 1998). While bureaucratic governance modes direct and guide actors, they may also limit flexibility

and innovation within collaborative groups (Lowndes and Skelcher 1998). Market or *incentive* modes of governance seek to affect behavior through the use of “incentives that reorient what individuals and groups within an organization or network are likely to want (i.e. their interests)” (Rodriguez et al. 2007, p. 157). Though incentive governance modes promote high flexibility among actors (Lowndes and Skelcher 1998), they may also influence participants to act according to independent instrumental interests, rather than that of a broader group. For example, a policy may promise greater access or prioritization for funding for the participation of a particular group in collaborative planning. *Network* governance modes – also referred to as clan or community governance – rely on social interaction, the development of trust, loyalty, and reciprocity, and the capacity to recognize shared and complementary interests as the organizing governance features (Lowndes and Skelcher 1998). Network modes of governance provide medium flexibility to actors (Thompson et al. 1991; Lowndes and Skelcher 1998), but do not have tangible incentive or enforcement mechanisms to encourage compliance with a stated policy. Network modes of governance are more emergent than structural, but joint forums such as task forces, committees, and trainings are designed to produce network governance (Rodriguez et al. 2007).

Though bureaucratic, regulatory approaches typified much of the natural resource policy until the late 20th century (McCool and Guthrie 2001), collaborative approaches to environmental governance, which are based in network governance, continue to emerge in response to environmental and social complexity and calls for decentralized natural resource management (Ansell and Gash 2008). A prominent public policy definition of

collaboration is “a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible” (Gray 1989). Gray also defines collaboration as “emergent” and “voluntary”, thus highlighting a reliance on network governance modes as organizing features. However, the appearance of mandated collaboration on the public policy landscape – wherein multiple parties are required by legislation or other administrative declarations to collaborate on the issue at hand– challenges such traditional network-based definitions. In mandated contexts, policy-makers must also draw from bureaucratic and incentive governance modes to structure collaborative forums.

Previous research has found that the modes of governance used to organize collaborative efforts have implications for collaborative success (Berke 1998; May and Burby 1996; Rodriguez et al. 2007; Brummel et al. 2010). In a study of mandated collaboration among public healthcare organizations in Canada, researchers found that relying only on network governance modes limited collaborative efforts, especially amongst parties with diverging interests and little previous history of collaboration (Rodriguez et al. 2007). Others have shown that coercive (bureaucratic) mandates for collaboration facilitate better procedural and substantive outcomes in contexts where there is less local commitment to stated policy objectives (May and Burby 1996). However, where participants maintain a higher commitment to achieving management objectives, cooperative (network and/or incentive) mandates facilitate collaborative

outcomes similar to coercive mandates and may ultimately have a greater potential to foster long-standing collaborations (May and Burby 1996).

Categories of governance modes are not mutually exclusive and are often used in conjunction (Berke 1998; Lowndes and Skelcher 1998; Rodriguez et al. 2007). In mandated collaboration, multiple categories of governance modes need to be drawn upon, and network modes may be particularly important throughout collaboration, even when bureaucratic or market modes prevail. However, different governance modes may be prominent at distinct stages of successful mandated collaborations. In particular, previous research shows that bureaucratic governance modes are important in convening collaborations, incentive modes in negotiating roles and interests, and network modes in maintaining collaborations (Lowndes and Skelcher 1998; Rodriguez et al. 2007).

It is important to acknowledge that governance modes are not structurally deterministic. Participants in a collaborative forum do not automatically take on the characteristics of the governance mode set in administrative mandates. Though evidence suggests that mandates foster improved planning and regulatory efforts on the local level (May and Burby 1996), parties targeted by mandates can disregard rules designed to ensure participation, refuse incentives, and decide not to collaborate (Berke 1998). Additionally, a governance mode can be both the organizing structure as well as an outcome of mandated collaboration (Lowndes and Skelcher 1998; Rodriguez et al. 2007). Thus one can think of governance mechanisms in both the “design stage” of a collaborative mandate, as well as reproduced or reinterpreted in the interactional stage (Rodriguez et al. 2007).

Research and Policy Context

As developed, westernized countries with large land-masses and diverse fire-prone ecosystems, Australia and the United States (US) face many similar wildland fire challenges. Fire management in both countries is made complex by expanding Wildland Urban Interfaces (WUIs), areas “where houses meet or intermingle with wildland vegetation” (USDA and USDI 2001). Further, fire intensity has increased in past decades and is predicted to become more severe due to fuels build-up from a legacy of aggressive fire suppression (in the US) (Stephens and Ruth 2005) and changing climates (in Australia and to a certain extent in the US) (Liu et al. 2010). Additionally, both Australia and the US have complex social and organizational landscapes of private landowners, federal, state, and local land managers, as well as emergency response agencies, all of which have a stake in wildland fire management. Consequently, policies in both countries have mandated collaboration on local/regional levels in hopes of addressing environmental, social, and organizational complexity.

This research focuses on a state wildland fire policy in New South Wales (NSW) because there is no federal policy regarding bushfire management in Australia. New South Wales is located in southeast Australia (Figure 6) and is considered one of the most fire-prone areas of the world (Pyne 1991). The US wildland fire policy is federal, though I focus on the eastern United States to address a geographic gap in the wildfire literature (Grayzeck-Souter et al. 2009). The eastern half of the US contains the greatest extent of WUI in the country (Radeloff et al. 2005) and WUI areas are the primary focus of the wildland fire planning component of the Healthy Forests Restoration Act. In light of the

literature gap and the extent of WUI areas in the East, study on collaborative, community-based wildland fire planning in the East will be particularly informative.

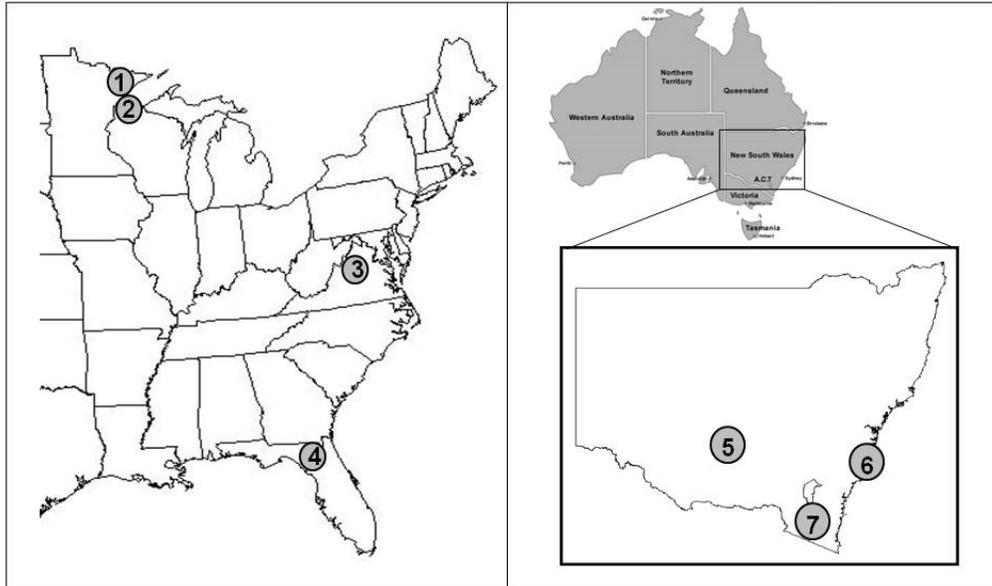


Figure 6. Locations of the case studies of collaborative wildland fire planning groups in the eastern United States and New South Wales (NSW), Australia examined in this research: (1) Lake County, Minnesota, (2) Barnes and Drummond, Wisconsin, (3) High Knob, Virginia, (4) Taylor, Florida, (5) Murrumbidgee Irrigation Area, NSW, (6) Illawarra, NSW, and (7) Snowy-Monaro, NSW.

In Australia, the 1997 Rural Fires Act is the principal legislation regarding bushfire management in New South Wales. The broad objectives of this policy are:

“(a) for the prevention, mitigation and suppression of bush and other fires... and (b) for the co-ordination of bush fire fighting and bush fire prevention throughout the State, and (c) for the protection of persons from injury or death, and property from damage, arising from fires, and (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)-(c) to be carried out having regard to the principles of ecologically sustainable development...” (Rural Fires Act Part I, Section 3).

This legislation also contains a provision for the formation of multi-stakeholder Bush Fire Management Committees (BFMCs) that, among other things, are required to collaboratively create bushfire plans to “...minimise the risk of adverse impact of bush fires on life, property, and the environment” (BFCC Policy 1/2008 – Annex B).

In the United States, the Healthy Forests Restoration Act (HFRA) of 2003 was established in the wake of a particularly severe wildland fire year in order “...to conduct hazardous fuels reduction projects...aimed at protecting communities, watersheds, and certain other at-risk lands from catastrophic wildfire, to enhance efforts to protect watersheds and address threats to forest and rangeland health, including catastrophic wildfire, across the landscape...” (HFRA 2003). Like the NSW Rural Fires Act, HFRA calls for the creation of Community Wildfire Protection Plans (CWPPs) to “identif[y] and prioritiz[e] areas for hazardous fuel reduction treatments and recommen[d] the types and methods of treatment...and recommen[d] measures to reduce structural ignitability throughout the at-risk community” that is “is developed within the context of the collaborative agreements” (HFRA 2003).

Research Questions

As discussed in the beginning of this chapter, both the US and NSW policies attempt to address the trans-boundary complexity inherent to wildland fire systems by mandating collaborative planning across organizational and property boundaries. A handful of empirical studies have examined mandated collaboration (e.g. Berke 1994 and French; Berke 1999; Rodriguez et al. 2007), though none, to my knowledge, have explicitly examined governance modes in mandated wildland fire planning. Thus, I take a

multi-level approach to examining the presence of governance modes in mandated collaborative wildland fire policy as well as in on-the-ground planning groups. In particular, I ask:

- (1) How do the US and NSW wildland fire policies draw upon bureaucratic, incentive, and network modes of governance in their policy design?
- (2) How are modes of governance in policy mandates met and realized by collaborative fire planning groups? Specifically, how do various modes of governance influence collaborative processes and outcomes?

Taking this comparative approach will expand understanding in the public policy literature on governance in mandated collaboration. Additionally, these findings will enhance the evaluation of mandated collaboration as a planning tool within communities of natural resource and fire management scholars, policy-makers, and practitioners.

Methods

To examine the modes of governance present in the design of the collaborative mandate, I conducted a review of the relevant legislation and policy documents in both the eastern United States (US) and New South Wales (NSW). Additionally, I conducted a total of seven case studies of collaborative fire planning groups in the eastern United States and New South Wales, Australia (Figure 6) using in-depth qualitative interviews with planning participants.

Policy Review

The primary information source for the policy analysis was the actual written legislation for the 1997 NSW Rural Fires Act and the US Healthy Forests Restoration Act (HFRA) of 2003. For NSW, I also reviewed state-level policy documents created by the Bush Fire Coordinating Committee (BFCC), which oversees regional Bush Fire Management Committees (BFMCs). In particular, I reviewed BFCC Policy 1/2006, which explains the functions and obligations of BFMCs and BFCC 1/2008, Annex B, which is an extensive handbook that prescribes the specific processes and approaches that BFMCs are to use in their planning. I conducted a qualitative analysis of the primary legislation, as well as these supplementary policies, iteratively reviewing and hand-coding all documents for evidence of the governance modes used to mandate and structure collaborative wildland fire planning. Ultimately, I coded each document for a list of collaborative governance elements (see Table 8) to compare governance modes across policy mandates. I identified these collaborative governance elements both through iterative coding and review of policy documents and according to literature that outlines important process-based aspects of collaborative planning (e.g. Innes and Booher 1999; Wondolleck and Yaffee 2000; Margerum 2002).

Case Studies

In 2006, from June to October, I assisted in conducting four case studies of collaborative wildland fire planning in the eastern United States. In 2008, from April and July, I conducted three case studies of collaborative bushfire planning groups in New South Wales, Australia. In both the eastern US and NSW, case study groups were

selected to represent variation in political, ecological, and social context. Further, I prioritized groups that had completed the bulk of their planning process within six months of the time of the study. In NSW, this limited selection to three planning groups that had completed a recently-released bushfire planning process created by the NSW Rural Fire Service and the Bush Fire Coordinating Committee.

In all cases, I attempted to interview as many planning participants as possible, prioritizing those who were most engaged according to meeting attendance records or per identification by a facilitator, process organizer, or other participants. Additionally, I strove to interview at least one representative from each participating organization or interest group in each planning area. I participated in 58 interviews with members of the four CWPP case studies in the eastern US – 16 in Lake County, Minnesota (MN); 13 in Barnes and Drummond, Wisconsin (WI); 18 in High Knob, Virginia (VA); and 9 in Taylor, Florida (FL) – as a member of a larger research team (Figure 6). I interviewed 44 participants in 3 BFMCs in NSW: 11 in the Murrumbidgee Irrigation Area (MIA), 12 in Illawarra, and 21 in Snowy-Monaro. Interviews were semi-structured, designed to understand collaborative context, process and outcome, and ran between 30 minutes to 2 hours. I digitally recorded all interviews with the permission of participants and audio was transcribed to text verbatim and checked by a second transcriptionist. I used both hand-coding and the qualitative analysis software NVivo 8 to organize data analysis. I coded specifically for evidence of bureaucratic, incentive, and network modes of governance represented in participants' initial interests in collaborating, their description of the planning process, as well as in describing important outcomes of their

collaboration. These interviews provided insight into how planning mandates were realized on the local level, as well as the influence of governance modes on collaborative process and outcomes.

Results

Governance Modes within Policy

Though both the New South Wales (NSW) Rural Fires Act and the United States (US) Healthy Forests Restoration Act seek to encourage cross-organizational fire planning and the reduction of fire risk through mandating local/regional collaboration, these policies differ by using distinctly different governance modes to structure the planning arena. While the NSW Rural Fires Act and accompanying state-level policies draw from bureaucratic modes of governance, the US Healthy Forests Restoration Act uses primarily network governance modes to foster collaboration and structure the planning process (Table 8).

The primary difference in bureaucratic versus network governance modes is that the NSW policy includes structural rules and procedures in the legislation, while the US policy includes a broad charge, enabling flexibility on the local level. For example, planning area boundaries are specifically delineated in NSW, while HFRA states that planning boundaries – including the designation of the Wildland Urban Interface (WUI) will be determined on the local level. Similarly, the NSW Rural Fires Act effectively requires the creation of a bushfire plan for all areas of the state, while the completion of a

CWPP through HFRA is more elective, at least as laid out in the federal legislation⁴. Specifically, the Rural Fires Act states that the state-level Bush Fire Coordinating Committee (BFCC) oversees the designation of Bush Fire Management Committee (BFMC) (RFA Division 3, Section 50) and that every BFMC must collaboratively produce a bush fire risk management plan (RFA Division 3, Section 52). Indeed, the entire state of New South Wales (except for urban areas within Sydney) is split into 44 BFMC zones and legislation outlines 15 potential organizational representative types for the BFMC. Alternatively, HFRA directs that CWPPs must be “established within the context of collaborative agreements” and must be agreed to by the local fire department, the appropriate state forestry agency, and another relevant local official, “in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community” (HFRA 2003, Title I Sec. 101.3A). While HFRA does mandate agreement by these three parties regarding the content of the CWPPs, it does not specifically require any community to complete a CWPP. However, HFRA does draw from incentive governance modes to encourage participation by giving those communities that have completed a CWPP priority in funding “to the maximum extent practicable” (HFRA 2003, Title I. Sec. 103.2B). Because HFRA partially determines collaborative group membership, gives a broad incentive to participation through a promise of prioritizing funding, and leaves plenty of room for “interested parties” to elect to participate on the local level, I consider group membership to be

⁴ Though the federal legislation does not *require* participation by at-risk communities, some states have met the flexible federal policy with specific requirements for participation on the local level.

Table 8. Governance modes used for collaborative design elements in the wildland fire planning policies in the eastern United States and New South Wales, Australia, 2010. The evaluation of each collaborative governance element as bureaucratic, network, or incentive is underlined.

Collaborative Governance Element	New South Wales Rural Fires Act (1997)	US Healthy Forests Restoration Act (2003)
<i>Creation of Wildland Fire Plan</i>	Mandated in legislation <u>Bureaucratic</u>	Not mandated, interest determined locally, but partially incentivized in legislation <u>Network/Incentive</u>
<i>Group Membership</i>	Specifically legislated <u>Bureaucratic</u>	Partially-determined and incentivized in legislation, <u>Bureaucratic/Network/Incentive</u>
<i>Planning Area</i>	Set in state-level policy <u>Bureaucratic</u>	Locally or regionally-determined <u>Network</u>
<i>Planning Process and Approach</i>	According to template <u>Bureaucratic</u>	Not addressed in legislation, locally-determined <u>Network</u>
<i>Paths of Accountability and Oversight</i>	Legally accountable to state council <u>Bureaucratic</u>	Accountable to three state/ local fire stakeholders <u>Network</u>
<i>Plan Renewal Schedule</i>	Set in policy as every five years <u>Bureaucratic</u>	Not addressed in legislation, locally-determined <u>Network</u>

structured through a combination of bureaucratic, incentive, and network governance modes (Table 8). However, group membership as outlined by the NSW Rural Fires Act is dominantly bureaucratic since the policy specifically identifies 15 stakeholder categories that must be invited to participate in BFMCs (Table 8).

Part of HFRA's flexibility lies in not directly addressing many of the collaborative governance elements that the Rural Fires Act does (Table 8). By default, this lack of guidance decentralizes decisions regarding collaborative design elements to CWPP participants on state, regional, or local levels, which is a hallmark of network modes of governance. But in NSW, for example, BFMC groups are required to create their bushfire plans according to the template and specifications laid out in a standardized handbook (See BFCC Policy Annex B – 2008/1). Further, the Rural Fires Act requires all plans to be approved by the BFCC and the Commissioner of the Rural Fire Service, and specifies that plans must be updated and re-approved every 5 years (Rural Fires Act, Division 4, Sec. 52). These are all rule-based, bureaucratic forms of governance. The US HFRA policy does not address any of those elements, leaving these decisions to planning groups.

Finally, each policy largely relies on a single category of governance mode through all stages of collaboration. Analysis of legislation and policy documents demonstrated that the NSW policy regarding collaborative bushfire planning is consistently bureaucratic: in bringing participants into the collaborative forum, in setting a standardized planning template for all groups, in establishing a direct line of accountability to central authorities, and in mandating a strict plan renewal schedule

(Table 8). Though the US policy draws from incentive governance modes to a certain extent and bureaucratic modes only slightly, the most critical collaborative stages are dominantly structured by network modes of governance (Table 8). In particular, US fire planning groups have no set planning template or approach, no formal paths of accountability, and no schedule for plan renewal, thus leading planning groups to determine those features through social interaction, the primary organizing feature of network modes of governance.

Governance Modes within Collaborative Planning Groups

Governance Modes as Motivating Collaboration

In both the eastern United States and New South Wales wildland fire planning groups, participants generally reflected the governance modes that structured each policy in describing their motivations for collaborating. In the eastern United States, participants reiterated the importance of network modes of governance – emerging from interaction and based in the desire for finding common ground – in driving their participation and their planning processes.

“We got talking [about] working together to get the agencies working more closely together.” (US)

“[The goal was] bringing the various...groups together and talking and working together towards a common goal that’s everybody’s responsibility.” (US)

There was also a strong narrative about the importance of incentive modes of governance in organizing the collaboration and bringing players to the table:

“Cut to the quick: it’s money. To help this community and to help ourselves...So I think that’s what [the CWPP] looked like, something we needed to do, so we can do something better in the future.” (US)

“You’re viewing this as there’s this carrot out there, called money... and if we get this done, well that’ll make us that much more in-line for getting some homeland security money...and [this CWPP] shows how interested we are in cooperatively working with everybody.” (US)

Thus, the promise of prioritized funding mentioned in the legislation – though vague – had entered and even structured conversations concerning collaboration at the most local levels.

Similarly, when talking about entering interests and motivations, NSW participants echoed the bureaucratic modes of governance that structured the Rural Fires Act.

“Well I think a lot of [participation] is to do with legislation so everybody is there because we’ve got a legislative requirement to participate and execute our responsibilities to the committee...” (NSW)

“[People’s primary motivation to participate was] probably legislation: ‘I have to do it.’.... legislation is starting to tie them in a little bit more and make them a bit more responsible for what they do.” (NSW)

“Well, most people’d say ‘Oh, the government wants this done, I have to do it. We’ve got to do this plan, we gotta do it, grit our teeth and bear it’.” (NSW)

The dominance of bureaucratic modes of governance in structuring the collaborative mandate did not entirely preclude the emergence of network governance motivational factors in New South Wales. Indeed, some NSW participants entered the planning process with an understanding of the importance of network governance in both collaborative process and outcomes.

“You know, to me that’s what the bushfire management committee is about; it’s about acting as a region, for the best interests of that region, to manage fire, and allowing everyone involved...to say, “How are you best managing fire?” So to me, that interest has always been there; it’s more that this formalizes that.”
(NSW)

Such participants recognized though bureaucratic, rule-based governance brought them to the table and created a “formalized environment” for collaboration, social interaction and finding common ground amongst planning partners were important benefits of collaboration.

New South Wales participants also stressed strategic motivations for participating in collaborative bushfire planning. Often organizations saw the process as an opportunity to get work done that they thought would not be possible outside of the collaborative context:

“There were players with[in] [our organization] who...saw the plan as an opportunity to better manage the risk associated with our assets on land that’s owned by other stakeholders on the [planning] committee...” (NSW)

There was also the sense that players needed to preserve strategically important relationships to maintain their own organizational capacities:

“[Our interest was] ... flying the flag and keeping a good relationship with the RFS because we need to use them for our...fire fighting purposes... Without the RFS we are up the creek without a paddle, we haven’t got the manpower.”
(NSW)

Others hoped to use collaborative planning as an opportunity to leverage other organizations to take certain actions they felt were in their own interest:

“[My primary interest was] accountability...[The plan] was an ability to make National Parks accountable for their fire management.” (NSW)

These more strategic motivations for collaboration may reflect the immediate reality and history of wildland fire in New South Wales as compared to some of the sites in the eastern United States. Additionally, such concerns emerge from a history of governmental inquiries and audits designed to hold individual organizations responsible for their fire management practices in the wake of severe fires (Chapter 3). Thus, within the context of a trans-boundary phenomenon such as wildland fire, bureaucratic forms of enforcement and review drove organizations towards a more strategic form of collaboration.

The Influence of Governance Mode on Collaborative Processes and Outcomes

The NSW process and planning characteristics were essentially standardized across groups under bureaucratic governance, while eastern US CWPP groups were variable in their interpretation and implementation of the mandating legislation under network governance. For example, all case study groups in NSW created plans for a relatively large area and were agency-driven. However, eastern US planning groups showed greater variation in the size of their planning area, as well as in group composition (agency-driven vs. community driven) (Figure 7). In NSW, the boundaries of the planning areas were set by state-level authorities according to groupings of several local government areas. In the eastern US, CWPP groups often set their own boundaries according to their planning objectives (see Grayzeck-Souter et al. 2009 for further reading). However, CWPP governance in many US states is mediated by state-level

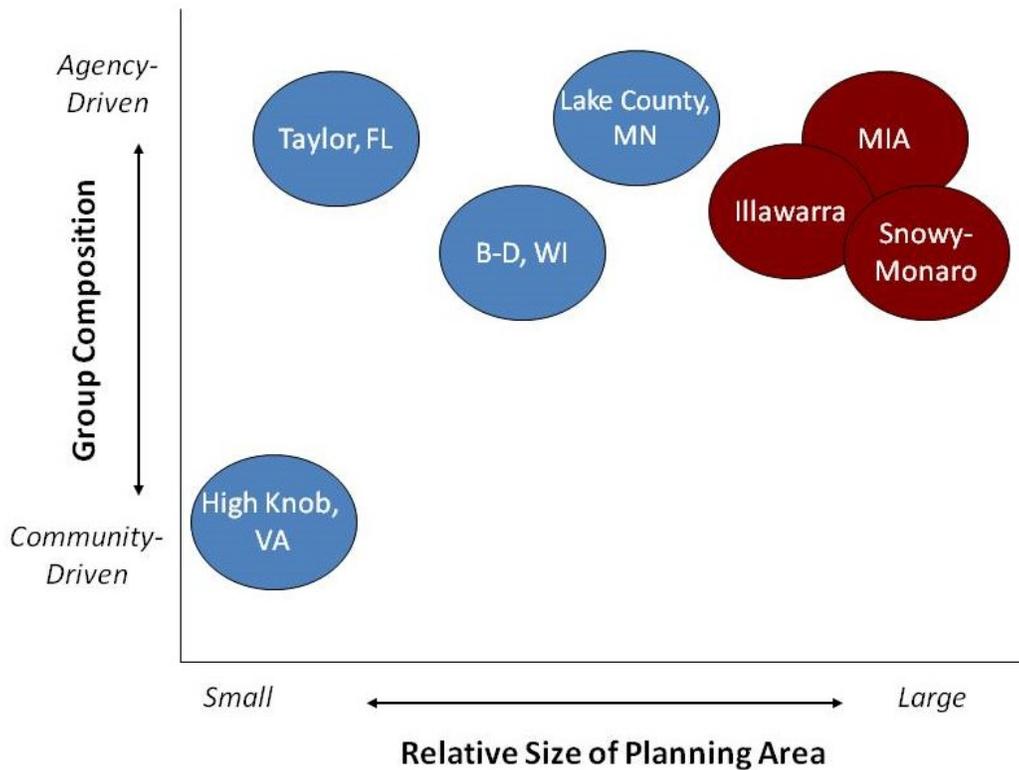


Figure 7. Eastern United States collaborative wildland fire planning groups (depicted in blue) show greater variation in planning area size and group composition than NSW groups (depicted in red).

departments that address natural resources, environmental and forestry issues. Thus, the governance modes set in HFRA evolved as state agencies or regional arms of federal agencies have stepped in and set standards for CWPPs on the state level. In Minnesota, for example, a series of county-level CWPPs were initiated by administrators in the Superior National Forest (US Forest Service) with partnership from county government and the Minnesota Department of Natural Resources. Land managers in Minnesota strategically defined CWPPs in Minnesota as a broader scale, county-level process that included federal lands, as well as partners from multiple organizations. In Virginia, however, the Department of Forestry took the lead on initiating CWPPs on a lesser scale

by focusing on individual communities defined as ‘at risk’ and in the case of High Knob, not including federal partners. This approach to CWPPs fit with the Virginia Department of Forestry’s already-existing Firewise program centered on homeowner education and action.

The network governance modes in the United States policy also allowed planning groups in the eastern United States to flexibly interpret the goals of the policy to meet their local planning objectives. In Barnes and Drummond, Wisconsin, for example, participants focused on strategic fuels reduction projects, improving suppression capabilities, and fostering community education on wildland fire management. The 400-home gated community of High Knob in Virginia took a different approach and used the CWPP process as a means to meet community objectives for improving egress and access to emergency vehicles, to encourage private homeowner responsibility for managing fuels around their property, and to build community capacity. Though common CWPP templates exist and are used in the United States (Grayzeck et al. 2009), each CWPP case study investigated used distinctly different planning processes and technologies to guide their collaborative actions. While planning was largely emergent and participant-driven in the eastern US case studies, planning techniques were top-down and driven by a standardized template in NSW.

“Yeah, I think the template was pretty fixed and people thought the easiest way was just to roll through the template, fill in the boxes.” (NSW)

This standardized approach set a clear agenda for participants, but also precluded the need for relational planning exercises such as collaborative objective-setting:

“...We didn’t get on the whiteboard and say ‘What are our objectives?’ ... [X] from head office came down and gave us...a presentation on this is what we are going to do, this is how we are going to do it. And then we sort of followed from there.” (NSW)

Consequently, planning processes and objectives were essentially identical across bushfire groups in NSW. Additionally, though there was some evidence of social learning occurring both within NSW (Chapter 2) and eastern US case studies (Chapter 1), New South Wales participants more often noted that the process led them towards a ‘negotiation’ model of decision-making over ‘consensus’ or ‘learning’ models of decision-making (Chapter 2):

“Our understanding is probably negotiated rather than shared...[We] agree to disagree and compromise...” (NSW)

Participants also pointed to individual strategic interests as an impediment to collaborative, consensus-based planning:

“[People] ...come at [planning] with their own issues, with their own concerns... they were too busy looking at their own patch and not looking at the big picture. This was a negotiation process. But it should be a[n] ...education process.” (NSW)

So while bureaucratic planning in NSW promoted an action-oriented, standardized process across all groups, it may have also diminished relational components of planning that often emerge in more flexible collaborative contexts.

The focus on action outcomes in NSW groups and social outcomes in eastern US groups again emerged when participants were asked to reflect on the most significant

outcome of the collaborative planning process. New South Wales participants highlighted the specific management actions that would come out of the planning process:

“I think [the most significant outcome will be] the hazard reduction, the prescribed burning.” (NSW)

“Well, hopefully [the most significant outcome will be] better risk management and better management of fire prone areas and eliminating quite a lot of the risks. Not eliminating them but at least managing them...” (NSW)

New South Wales participants also linked the importance of carrying out actions to the bureaucratic oversight of central agencies that they felt would certainly be monitoring and auditing their work:

“I need to be referring to [the bushfire plan and] say, “Right, this is what I have to do,” because the plan’s going to be audited. So at the end of the day, I am going to be responsible to make sure they’re ticked off, and if they’re not ticked off, they’re going to be saying, “Why?” ... Whatever is written in there, I have to do.” (NSW)

“I think it’s going to be very much a plan that has some clear, auditable actions...I think this time people have been a bit more mindful of making sure that we set achievable goals.” (NSW)

In the eastern US CWPP case studies, however, participants emphasized social and relational outcomes of the collaborative planning process.

“I think...the most [significant outcome] was just getting the people together to communicate and work together as a group to....hopefully all accomplish the same thing...” (US)

“I’ll still go back to bringing the various... groups together and talking and working together towards a common goal that’s everybody’s responsibility.” (US)

“[The most significant outcome was] to show that it could be done. We could communicate as a group, and you could take agencies that have different focuses, bring them together and everybody come through it okay. I think...it proved that there's a great working relationship in this part of the world. And we can take a difficult issue and we can find ways to make things better.” (US)

Thus, participants collaborating within network-driven mandates emphasized improved social outcomes, while those collaborating within bureaucratic-driven mandates highlighted concrete actions and implementation enforcement as crucial outcomes. Thus, the dominant category of governance mode influences participants' evaluation of the most important outcomes emerging from collaboration. Further, empirical evidence supports the assertion that social outcomes such as social learning and relationship building were more prominent in the eastern United States than in New South Wales (Chapter 1; Chapter 2). Though participants in NSW highlighted tangible outcomes more than participants in the eastern US, this study cannot speak to actual differences in implementation and action-oriented outcomes.

Discussion

Mandated collaboration has emerged as a means to promote the benefits of grassroots collaboration and facilitate multi-party action within more traditional legislative contexts (May and Burby 1996; Lowndes and Skelcher 1998; Rodriguez et al. 2007). This research investigated two wildland fire policies – one in the United States (US) and one in New South Wales (NSW), Australia – that mandated multi-party collaboration around wildland fire planning. Both policies sought to address the social, ecological, and organizational complexity inherent to wildland fire systems by drawing-

in multiple stakeholders to create a collaborative and integrated fire management plan for their area. However, each policy took a distinct approach to structuring collaborative mandates: the NSW policy drew from largely bureaucratic modes of governance and the US policy relied largely on network and, to a lesser extent, incentive modes of governance. Planning groups reflected the governance modes set in policy when describing their motivations for and primary interests in collaborating. Thus, I argue that in policy-mandated collaboration, structural aspects of the mandate itself influence the ways participants frame and implement collaboration on the local level. In NSW, for instance, participants largely viewed collaborative bushfire planning as a required exercise and often entered the planning process with strategic individual interests. In the eastern US, participants stressed the desire to secure funding for fire management, as well as hopes for finding common ground with other stakeholders. Thus, I agree with Rodriguez et al.'s (2007) conceptualization of governance modes "not as fixed structures but as entities that are both the medium and outcomes of mandated processes of collaboration", but I specifically posit that governance modes utilized in the "design mode" tend to reproduce the same governance modes in the "operations" or planning stage.

As other research has shown (e.g. Lowndes and Skelcher 1998; Rodriguez et al. 2007; Brummel et al. 2010), governance modes also influenced collaborative process in the case studies I examined. Bushfire planning groups in NSW were standardized in their planning characteristics (e.g. size of the planning area, group composition) as well as in their general approach to bushfire management. Others have noted that such

standardization is common with bureaucratic modes of governance (e.g. Berke 1998; Lowndes and Skelcher 1998), but caution that formalization can reduce collaborative innovation. While it is difficult to evaluate the effect of bureaucratic governance modes on innovative thinking within a single study, I did find that the use of a standardized planning template limited certain relational aspects of collaborative planning such as joint goal setting and social learning. Conversely, eastern US case studies were more variable in planning area size, group composition, as well as the substantive planning goals each group addressed. This is consistent with previous work on CWPP groups in the US, which also concludes that a flexible federal policy such as HFRA leads to flexible interpretation on the local level (Grayzeck et al. 2009; Jakes et al. 2011). Again, this type of plasticity is a hallmark of network and incentive modes of governance (Berke 1998; Lowndes and Skelcher 1998; Rodriguez et al. 2007). Additionally, in previous publications on these eastern US case studies (see Brummel et al. 2010; Jakes et al. 2011), researchers found strong evidence of relational process elements – such as social learning, creative leadership/facilitation, and joint goal-setting – that was limited in NSW groups (Chapter 2; Chapter 3).

Finally, participants in NSW and the eastern US provided different evaluations of what they believed to be the most significant outcomes of their collaborative planning processes. These findings suggest that bureaucratic governance embedded in both the policy and the planning process led to a focus on action-oriented outcomes by participants, emerging in part from a culture of enforcement and oversight by central authorities. This governance trend of enforcement and accountability comes, in part, from

a series of governmental inquiries that reviewed fire management actions in the wake of destructive bushfires (see Chapter 3). Alternatively, network governance modes focused participants towards highlighting relational outcomes in their evaluation of collaborative planning and fostered improved social outcomes (e.g. social learning, network building) in the eastern US case study groups as compared to NSW groups. These findings, as well as my conclusions about collaborative process, hint toward the converse assertion that bureaucratic modes of governance, on their own, may produce limited social outcomes.

So, what do these findings mean for an evaluation of collaborative success? Do participants' evaluations of limited social or action-oriented outcomes indicate that either collaboration was not 'successful'? The broader collaboration literature provides insight into what might constitute collaborative success. Conley and Moote (2003) identify and critique three broad frameworks evaluating collaboration: evaluating participant perception, evaluating process criteria, and evaluating tangible outcomes. Based on a suite of common process evaluation measures alone – such as inclusive stakeholder involvement, an emergent and self-organizing process, extended and meaningful engagement, shared goal setting, and creative system-level thinking (see Gray 1989; Innes and Booher 1999; Wondolleck and Yaffee 2000; Bentrup 2001; Daniels and Walker 2001; Margerum 2002) – one might deem the eastern United States planning groups more successful because they engaged in more emergent and relational planning processes through network governance. However, focusing on outcome-based criteria, one may argue that New South Wales planning groups were more successful since bureaucratic methods of enforcement and oversight could potentially produce more

consistent achievement of policy and planning objectives. Given the scope of this study, it is difficult to make normative evaluations of which policy and consequently what governance approach might be 'better' for mandating collaborative planning. Rather, this research highlights that each wildland fire planning policy fosters qualitatively different collaborative processes and outcomes. A broader, perhaps quantitative or longitudinal study could be conducted to further explore the question of which of these policies fosters greater 'collaborative success'.

Research on governance modes in mandated collaboration (e.g. May and Burby 1996; Lowndes and Skelcher 1998; Rodriguez et al. 2007) does suggest that both the US and NSW could strengthen their wildland fire policies for mandated collaboration by drawing upon multiple, complementary categories of governance modes, as well as by recognizing the importance of certain governance modes at specific points during collaboration. As an example, the NSW policy, which relies entirely on bureaucratic modes of governance to structure collaboration, may foster improved social benefits by building greater flexibility into planning stages of the collaboration through the use of network governance. This may be achieved in something as simple as allowing planning groups to identify a few planning objectives that address particular local concerns in addition to the planning objectives set in the policy. This type of network governance activity could foster creative dialogue, constructive conflict, joint goal setting, social learning, and promote local ownership of the plan, all which are characteristics of successful collaboration that did not emerge strongly in the case studies examined (see Chapter 1; Chapter 2). Alternatively, the US policy may encourage more action-oriented

outcomes by drawing from bureaucratic mechanisms such as review of documents by a central authority or by requiring progress reports on proposed planning actions. This kind of bureaucratic accountability and oversight could complement the heavily network governance-based CWPP processes.

Though this research contributes to public policy, planning, and wildland fire management literature with a qualitative analysis of the influence of governance modes on mandated collaborative planning processes, there is room for further inquiry. In particular, future study could examine the collaborative achievement of tangible, policy-related outcomes over time. Though action-oriented outcomes were not heavily emphasized by wildland fire planning participants in the eastern United States, longitudinal studies may reveal that the social networks produced through planning may better support long-term implementation and management (see Burby 2003).

Additionally, one research design element of note is that this study compares a federal policy in the United States with a state-level policy in New South Wales, Australia. Some could argue that this comparative may be problematic since the flexibility of HFRA comes in part from a governance philosophy valuing states rights in meeting and interpreting the federally-mandated collaboration. However, I hold that it is an advantage that this study was able to examine and capture some of the strengths and weaknesses of the HFRA policy at a relatively early stage; as states develop their approaches to realizing HFRA's flexible federal mandate, this study may inform those state-level policies and ultimately allow for the adaptive creation of state-level wildland fire planning policies. Thus, future research could extend this line of inquiry in the United States to examine the

ways that states meet HFRA's flexible federal mandate with state-level policies or programs.

Conclusion

Though both policies I analyzed sought to improve wildland fire management by mandating collaborative planning, each drew upon distinct categories of governance with particular consequences for planning groups, collaborative process, and anticipated planning outcomes. The New South Wales policy used entirely bureaucratic modes of governance to organize their collaborative mandate, and in turn, planning groups realized this mandate with highly-structured planning processes, goals for achieving tangible action under potential audits from central authorities, and perhaps limited social outcomes that scholars often cite as primary benefits of collaboration. The United States policy drew upon primarily network governance modes, which created an environment where planning groups largely determined their own planning process and focused on the beneficial social outcomes of collaboration. Though I do not draw specific conclusions regarding the 'success' of each policy in mandating collaborative wildland fire planning, I argue that both policies may see improved collaborative processes and outcomes by incorporating new modes of governance – network in New South Wales and bureaucratic in the United States – into the mandating structure. These findings strengthen and enrich public policy literature that draws a link between collaborative mandates, the modes of governance used to structure those mandates, and the influence of those governance modes on collaborative processes and outcomes. The research also provides empirical evidence for wildland fire policy-makers and planners to draw upon when considering

which categories of governance to utilize for achieving particular collaborative planning goals. Greater awareness of the prevalence and use of various governance modes in policies, and in collaborative mandates in particular, will contribute to more intentional, well-conceived, and ultimately more successful planning processes and outcomes.

Conclusion

Policy-makers in New South Wales (NSW), Australia and the United States (US) have innovated wildland fire planning through incorporating philosophies of collaborative governance. By mandating collaboration within legislation, these governments seek to enhance coordination across organizational and interest boundaries, to integrate wildland fire planning objectives, and to generally improve wildland fire planning outcomes. In this dissertation, I examined and compared two policies – the US Healthy Forests Restoration Act of 2003 and the NSW Rural Fires Act of 1997 – with the goal of evaluating the influence of policy-mandated collaboration on wildland fire planning processes. Through multiple case studies of collaborative planning groups in the eastern United States and the Australian state of New South Wales, I conducted an in-depth exploration of social learning and group decision-making, the development of social networks and inter-organizational communication networks, and substantive management approaches as they related to the co-construction and management of the fire environment. Further, I stepped back to conduct a comparative analysis of bureaucratic, network, and incentive governance modes on the policy level, examining in particular how they influenced collaborative processes and outcomes on the ground. Based on these analyses, I highlight four broad concluding themes that have emerged from this work: (1) the prominent tension between policy flexibility and structure in influencing mandated collaborations, (2) the implications of prescribing standardized tools for planning processes and outcomes, 3) the importance of extended engagement

towards achieving the benefits of collaborative governance, and (4) the critical influence of local context on policy-mandated collaborative planning.

Taken together, this research highlights the constant tension between flexibility and administrative directives within policy design, and within legislated collaboration more specifically. Furthermore, each of these approaches has distinct implications for mandated collaborative planning. For example, where flexible approaches foster locally-specific planning and positive social outcomes, they may also have limited federal oversight. Similarly, where bureaucratic collaborative mandates may promote strategic, action-oriented planning and accountability in implementation, they may constrain local innovation and restrict relational outcomes. Thus, managing the tension between flexibility and administrative oversight within wildland fire, conservation, and environmental policy is a central task for policy-makers seeking to promote collaboration through policy mandates. To foster both tangible action and socially-positive planning processes, policy-makers need to incorporate both flexible and bureaucratic elements within mandates and at multiple stages of the collaborative forum.

One particular bureaucratic element of mandated collaboration – the required use of a standardized planning template – substantively affects collaborative planning through the prescriptive generation of knowledge. While templates like the risk-based process in NSW foster strategic, efficient, and consistent planning, they also promote systematically-biased understandings of the environment. In creating rational and organized processes to address the management of environmental systems, certain perspectives and approaches are necessarily left out. For example, the NSW risk planning

template emphasized hazard mitigation objectives and the protection of fire-sensitive threatened species over broader-scale ecological processes such as forest regeneration and conservation. This is not to suggest, however, that policy-makers and managers should completely abandon the use of planning templates. Indeed, such tools are often sought by planning groups looking for guidance in the absence of specific planning directives. However, planners need to be aware of the tradeoff between standardization and the promotion of bias in planning, and ultimately be open to the adaptive redesign of planning templates to address that tension.

This dissertation also highlights the importance of extended collaborative engagement to achieving sustainable environmental management. In particular, planning efforts require long-term commitment to achieve and maintain the full benefits of collaborative governance. Planning processes focused on the rapid production of a product, such as a singular management plan, may experience limited social network building and social learning outcomes. By extending and maintaining collaborative efforts into implementation, monitoring, and follow-up planning efforts, participants may achieve improved environmental *and* social outcomes. There is a role for policy mandates in framing this extended action, as well as for local leaders in dedicating to the long-term collaborative management of natural resources.

Though mandates for collaboration may intend to facilitate certain outcomes or produce standardized management, local context is an integral factor in determining the course of collaborative planning. Even with a well-designed mandate that balances flexibility and administrative oversight, certain planning groups may experience

consistent barriers to collaboration. Alternatively, some planning groups may produce highly successful collaborations within the context of poorly-designed policy mandates. Thus, policy-makers also need to recognize the limits of collaborative mandates. Due to their rich experience and knowledge of their own local context, planning participants can guide the realization of policy mandates to maximize the benefits of collaboration on the local level.

Thus, policy mandates for collaboration represent the *potential* to bridge ecological and social scales in wildland fire planning by ‘burning through’ organizational, property, and geopolitical boundaries. For example, policy can set the structural context for collaboration, but learning, relationship-creation, and the integration of planning goals must occur through a dedication to achieving these outcomes at the local level. Further, the design of the policy mandate has far-reaching implications for planning processes and outcomes, including which representatives may be major players and which may be marginalized. However, policy-mandated collaborative planning also allows for the negotiation of boundaries in subtler, more relational (and less substantive) ways. Through learning about other organizations’ priorities, participants may identify future opportunities for collaboration. Additionally, by making new connections with other stakeholders, even for a short time, planning participants understand more about the broader wildland fire system. These smaller, relational changes represent the *opportunity* for future innovation across organizational boundaries. Thus, by bringing together multiple wildland fire stakeholders in a single planning arena, mandated collaboration signifies an important innovation in public policy and wildland fire planning.

Though this dissertation provides an in-depth analysis of mandated collaborative wildland fire planning, it also highlights multiple research directions for the fields of public policy and planning, conservation biology, and wildland fire management. Because my analysis focused largely on process-based and relational aspects of mandated collaboration, there is ample opportunity to extend this evaluation to examine how collaborative planning groups may achieve tangible policy and ecological management goals. Moreover, using the conclusions of this research as a guide, future research could develop and evaluate new planning tools for achieving integration of hazard reduction and conservation objectives, positive organizational and relational outcomes, and innovative and locally-relevant approaches to wildland fire management. This type of work would take a long-term commitment, but is necessary to identify the possible extended outcomes of mandated collaboration and prescriptive planning tools. Finally, this research identified contextual factors such as recent wildland fire events, history of organizational conflict, and planning group size as important in influencing the course of collaborative planning. Additional in-depth work examining a range of contextual factors could highlight how local contextual factors and policy-mandating structure co-influence the success of collaborative planning efforts. Ultimately, such research would allow for the early assessment of the potential effect of policy-mandated collaboration in specific planning contexts.

In a world of changing climates and expanding human development, wildland fire will be a continuing challenge in fire-prone environments. Consequently, research on institutional and policy aspects of wildland fire management is necessary to develop

theoretical knowledge and practice-based systems to address the socio-ecological complexity of wildland fire. This dissertation explored and evaluated two manifestations of policy-mandated collaboration for wildland fire planning and ultimately informs wildland fire and environmental governance theory and practice. Though wildland fire will continue to burn through boundaries, mandated collaboration represents a potential institutional innovation for addressing the trans-boundary complexity of wildland fire systems.

Bibliography

- Adger, W. N., K. Brown, and E. L. Tompkins. 2005. The political economy of cross-scale networks in resource co-management. *Ecology and Society* **10**(2):9.
- Annex B to BFCC Policy 1/2008. Bush fire risk management plan guidelines for bush fire management committees. 1-108.
- Ansell, C., and A. Gash. 2008. Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory* **18**(4):543-571.
- Argyris, C. and D. Schön. 1978. *Organizational learning: a theory of action perspective*. Addison-Wesley, Reading, Massachusetts.
- Arnstein, J. 1969. A ladder of citizen participation. *Journal of the American Planning Association* **35** (4):216-224.
- Ascher, W. 2001. Coping with complexity and organizational interests in natural resource management. *Ecosystems* **4**(8):742-757.
- Ashforth, B. E., G. E. Kreiner, and M. Fugate. 2000. All in a day's work: Boundaries and micro role transitions. *Academy of Management Review* **25**(3):472-491.
- Barham, E. 2001. Ecological boundaries as community boundaries: The politics of watersheds. *Society & Natural Resources* **14**(3):181-191.

- Beierle, T. C. 2002. The quality of stakeholder-based decisions. *Risk Analysis* **22**(4):739-749.
- Bentrup, G. 2001. Evaluation of a collaborative model: A case study analysis of watershed planning in the intermountain west. *Environmental management* **27**(5):739-748.
- Berke, P. R., and S. P. French. 1994. The influence of state planning mandates on local-plan quality. *Journal of Planning Education and Research* **13**(4):237-250.
- Berke, P. R., J. Dixon, and N. Ericksen. 1997. Coercive and cooperative intergovernmental mandates: A comparative analysis of Florida and New Zealand environmental plans. *Environment and Planning B-Planning & Design* **24**(3):451-468.
- Berke, P. R. 1998. Reducing natural hazard risks through state growth management. *Journal of the American Planning Association* **64**(1):76-87.
- Berke, P. R., J. Crawford, J. Dixon, and N. Ericksen. 1999. Do cooperative environmental planning mandates produce good plans? Empirical results from the new Zealand experience. *Environment and Planning B-Planning & Design* **26**(5):643-664.
- Berkes, F. 2004. Rethinking community-based conservation. *Conservation Biology* **18**(3):621-630.

- Bidwell, R. D., and C. M. Ryan. 2006. Collaborative partnership design: The implications of organizational affiliation for watershed partnerships. *Society & Natural Resources* **19**(9):827-843.
- Bodin, O., and B. I. Crona. 2009. The role of social networks in natural resource governance: What relational patterns make a difference? *Global Environmental Change-Human and Policy Dimensions* **19**(3):366-374.
- Bodin, O., B. Crona, and H. Ernstson. 2006. Social networks in natural resource management: What is there to learn from a structural perspective? *Ecology and Society* **11**(2):r2.
- Bond, W. J., and J. E. Keeley. 2005. Fire as a global 'herbivore': The ecology and evolution of flammable ecosystems. *Trends in Ecology & Evolution* **20**(7):387-394.
- Booher, D. E., and J. E. Innes. 2002. Network power in collaborative planning. *Journal of Planning Education and Research* **21**(3):221-236.
- Borchers, J. G. 2005. Accepting uncertainty, assessing risk: Decision quality in managing wildfire, forest resource values, and new technology. *Forest Ecology and Management* **211**(1-2):36-46.
- Borgatti, S. P., and P. C. Foster. 2003. The network paradigm in organizational research: A review and typology. *Journal of Management* **29**(6):991-1013.

- Bouwen, R., and T. Taillieu. 2004. Multi-party collaboration as social learning for interdependence: Developing relational knowing for sustainable natural resource management. *Journal of Community & Applied Social Psychology* **14**(3):137-153.
- Bowman, D. M. J. S., J. K. Balch, P. Artaxo, W. J. Bond, J. M. Carlson, M. A. Cochrane, C. M. D'Antonio, R. S. DeFries, J. C. Doyle, S. P. Harrison, F. H. Johnston, J. E. Keeley, M. A. Krawchuk, C. A. Kull, J. B. Marston, M. A. Moritz, I. C. Prentice, C. I. Roos, A. C. Scott, T. W. Swetnam, G. R. van der Werf, and S. J. Pyne. 2009. Fire in the earth system. *Science* **324**(5926):481-484.
- Bradstock, R. A. 2008. Effects of large fires on biodiversity in south-eastern Australia: Disaster or template for diversity? *International Journal of Wildland Fire* **17**(6):809-822.
- Brooks, M. L., C. M. D'Antonio, D. M. Richardson, J. B. Grace, J. E. Keeley, J. M. DiTomaso, R. J. Hobbs, M. Pellant, and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. *Bioscience* **54**(7):677-688.
- Brosius, J. P. 2006. Common ground between anthropology and conservation biology. *Conservation Biology* **20**(3):683-685.
- Brummel, R. F., K. C. Nelson, S. G. Souter, P. J. Jakes, and D. R. Williams. 2010. Social learning in a policy-mandated collaboration: Community wildfire protection

- planning in the eastern United States. *Journal of Environmental Planning and Management* **53**(6):681-699.
- Bull, R., J. Petts, and J. Evans. 2008. Social learning from public engagement: dreaming the impossible? *Journal of Environmental Planning and Management* **51**(5):701-716.
- Burby, R. J. 2003. Making plans that matter – citizen involvement and government action. *Journal of the American Planning Association* **69**(3):245-264.
- Burns, M., and A. S. Cheng. 2007. Framing the need for active management for wildfire mitigation and forest restoration. *Society & Natural Resources* **20**(3):245-259.
- Busenberg, G. 2004a. Wildfire management in the United States: the evolution of a policy failure. *Review of Policy Research* **21**:145-156.
- Busenberg, G. J. 2004b. Adaptive policy design for the management of wildfire hazards. *American Behavioral Scientist* **48**(3):314-326.
- Bush Fire Coordinating Committee (BFCC) Policy 1/2006: Bush Fire Management Committees. pp. 1-5.
- Carroll, M. S., P. J. Cohn, D. N. Seesholtz, and L. L. Higgins. 2005. Fire as a galvanizing and fragmenting influence on communities: The case of the Rodeo–Chediski fire. *Society & Natural Resources* **18**(4):301-320.

- Carroll, M. S., L. L. Higgins, P. J. Cohn, and J. Burchfield. 2006. Community wildfire events as a source of social conflict. *Rural Sociology* **71**(2):261-280.
- Catton, W.R.J and R.E. Dunlap. 1978. Environmental sociology: a new paradigm. *American Sociologist* **13**:41-49.
- Champ, J. G., D. R. Williams, and K. Knotek. 2009. Wildland fire and organic discourse: Negotiating place and leisure identity in a changing wildland urban interface. *Leisure Sciences* **31**(3):237-254.
- Cheng, A. S., and S. E. Daniels. 2003. Examining the interaction between geographic scale and ways of knowing in ecosystem management: A case study of place-based collaborative planning. *Forest Science* **49**(6):841-854.
- Conley, A., and M. A. Moote. 2003. Evaluating collaborative natural resource management. *Society & Natural Resources* **16**(5):371-386.
- Cooke, B. and U. Kothari. 2001. The case for participation as tyranny. Pages 1-15 in B. Cooke and U. Kothari, editors. *Participation: the new tyranny?* Zed Books, New York, New York.
- Crona, B., and O. Bodin. 2006. What you know is who you know? Communication patterns among resource users as a prerequisite for co-management. *Ecology and Society* **11**(2):7.

- Dal Fiore, F. 2007. Communities versus networks - the implications on innovation and social change. *American Behavioral Scientist* **50(7):857-866.**
- Daniels, S., and G. Walker. 1996. Collaborative learning: Improving public deliberation in ecosystem-based management. *Environmental Impact Assessment Review* **16(2):71-102.**
- Daniels, S.E. and G.B. Walker. 2001. Working through environmental conflict: The collaborative learning approach. Praeger, Westport, Connecticut.
- Diani, M., 2003. 'Leaders' or brokers? Positions and influence in social movement networks. Pages 105-122 in M. Diani, and D. McAdam, editors. *Social movements and networks: Relational approaches to collective action.* Oxford University Press, Oxford.
- Dean, M. 1999. *Governmentality: power and rule in modern society.* Sage Publications Inc., Thousand Oaks, California.
- Degenne, A. and M. Forsé. 1999. *Introducing social networks.* Sage Publications Inc., Thousand Oaks, California.
- Dellasala, D. A., J. E. Williams, C. D. Williams, and J. E. Franklin. 2004. Beyond smoke and mirrors: A synthesis of fire policy and science. *Conservation Biology* **18(4):976-986.**

- Demeritt, D. 2002. What is the 'social construction of nature'? A typology and sympathetic critique. *Progress in Human Geography* **26**(6):767-790.
- Dennis-Parks, R. M. 2004. Healthy Forests Restoration Act - will it really protect homes and communities? *Ecology Law Quarterly* **31**(3):639-664.
- Deyle, R. and C.S. Slotterback. 2009. Group learning in participatory planning processes: An exploratory quasiexperimental analysis of local mitigation planning in Florida. *Journal of Planning Education and Research* **29**:23-38.
- Dombeck, M. P., J. E. Williams, and C. A. Wood. 2004. Wildfire policy and public lands: Integrating scientific understanding with social concerns across landscapes. *Conservation Biology* **18**(4):883-889.
- Emirbayer, M. 1997. Manifesto for a relational sociology. *American Journal of Sociology* **103**(2):281-317.
- Ernstson, H., S. Sorlin, and T. Elmqvist. 2008. Social movements and ecosystem services-the role of social network structure in protecting and managing urban green areas in Stockholm. *Ecology and Society* **13**(2):39.
- Fernandes, P. M., and H. S. Botelho. 2003. A review of prescribed burning effectiveness in fire hazard reduction. *International Journal of Wildland Fire* **12**(2):117-128.
- Field, D. R., and D. A. Jensen. 2005. Humans, fire, and forests: Expanding the domain of wildfire research. *Society & Natural Resources* **18**(4):355-362.

- Fischer, F. 2000. Citizens, experts, and the environment: The politics of local knowledge. Duke University Press, Durham, North Carolina.
- Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources* **30**:441-473.
- Folke, C., L. Pritchard Jr., F. Berkes, J. Colding, and U. Svedin. 2007. The problem of fit between ecosystems and institutions: Ten years later. *Ecology and Society* **12**(1):30.
- Freeman, L.C. 1979. Centrality in social networks: Conceptual clarification. *Social Networks* **1**:215-239.
- Geist, K. and S.M. Galatowitsch. 1999. Reciprocal model for meeting ecological and human needs in restoration projects. *Conservation Biology* **13**(5): 970-979.
- Genskow, K. D. 2009. Catalyzing collaboration: Wisconsin's agency-initiated basin partnerships. *Environmental management* **43**(3):411-424.
- Gill, A.M. 1981. Post-settlement fire history in Victorian landscapes. Pages 78-98 in Gill, A.M., R.H. Groves, and I.R. Noble, editors. *Fire and the Australian biota*, Australian Academy of Science, Canberra.
- Gill, A. M., and S. L. Stephens. 2009. Scientific and social challenges for the management of fire-prone wildland-urban interfaces. *Environmental Research Letters* **4**(3):034014.

- Goldman, M., and R. A. Schurman. 2000. Closing the "great divide": New social theory on society and nature. *Annual Review of Sociology* **26**:563-584.
- Granovetter, M. 1985. Economic-action and social-structure - the problem of embeddedness. *American Journal of Sociology* **91**(3):481-510.
- Gray, B. 1989. *Collaborating: Finding common ground for multiparty problems*. Jossey-Bass, San Francisco, California.
- Grayzeck-Souter, S. A., K. C. Nelson, R. F. Brummel, P. Jakes, and D. R. Williams. 2009. Interpreting federal policy at the local level: The wildland-urban interface concept in wildfire protection planning in the eastern United States. *International Journal of Wildland Fire* **18**(3):278-289.
- Groom, M.J., G.K. Meffe, and C.R. Carroll. 2006. *Principles of conservation biology*, 3rd edition. Sinauer Associates Inc., Sunderland, Massachusetts.
- Hajer, M.A. 1995. *The politics of environmental discourse: ecological modernization and the policy process*. Oxford University Press Inc., New York, New York.
- Handmer, J. 2003. Institutions and bushfires: fragmentation, reliance and ambiguity. Pages 139-149 in G. Cary, D. Lindenmayer, and S. Dovers. *Australia Burning*. CSIRO Publications, Collingwood, Victoria.

- Hann, W. J., and D. L. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. *International Journal of Wildland Fire* **10**(3-4):389-403.
- Hanneman, R.A. and M. Riddle. 2005. Introduction to social network methods. Available from <http://faculty.ucr.edu/~hanneman/> (Accessed May 2010)
- Hannigan, J. 2006. *Environmental Sociology*. 2nd edition. Routledge, New York, New York.
- Hasson, A. E. A., G. A. Mills, B. Timbal, and K. Walsh. 2009. Assessing the impact of climate change on extreme fire weather events over southeastern Australia. *Climate Research* **39**(2):159-172.
- Healey, P. 1992. Planning through debate: the communicative turn in planning theory. *Town Planning Review* **63**:143-162.
- Healthy Forests Restoration Act (HFRA), 2003. 16 U.S.C.A. §§ 6501-6591. Public Law 108-148.
- Holmes, C. M., F. Berkes, and C. Folke. 2001. Navigating the socioecological landscape. *Conservation Biology* **15**(5):1466.
- Imperial, M. 2005. Using collaboration as a governance strategy - lessons from six watershed management programs. *Administration & Society* **37**(3):281-320.

- Innes, J. E., and D. E. Booher. 1999. Consensus building and complex adaptive systems - A framework for evaluating collaborative planning. *Journal of the American Planning Association* **65**(4):412-423.
- Innes, J. E., and D. E. Booher. 1999. Consensus building as role playing and bricolage - toward a theory of collaborative planning. *Journal of the American Planning Association* **65**(1):9-26.
- Irwin, A. 2001. *Sociology and the environment: a critical introduction to society, nature, and knowledge*. Blackwell Publishers Inc., Malden, MA.
- Jakes, P., K.C. Nelson, E. Lang, M. Monroe, S. Agrawal, L. Kruger, V. Sturtevant, S. McCaffrey, and Y. Everett. 2003. A model for improving community preparedness for wildfire. Pages 4-9 in P. Jakes, editor. *Homeowners, communities and wildfire: science findings from the National Fire Plan*. General technical report NC-23. USDA Forest Service, Northern Research Station.
- Jakes P. J. and K.C. Nelson. 2007. Community interaction with large wildland fire events: critical initiatives prior to the fire. Pages 91-103 in T. Daniel, M. Carroll, C. Moseley and C. Raish, editors. *People, Fire and Forests*. Oregon State University Press, Corvallis, Oregon.
- Jakes, P. 2007. Social science informing forest management - bringing new knowledge to fuels managers. *Journal of Forestry* **105**(3):120-124.

- Jakes, P., L. Kruger, M. Monroe, K. Nelson, and V. Sturtevant. 2007. Improving wildfire preparedness: Lessons from communities across the US. *Human Ecology Review* **14(2)**:188-197.
- Jakes, P.J., K.C. Nelson, S.A. Enzler, S. Burns, A.S. Cheng, V. Sturtevant, D.R. Williams, A. Bujak, R.F. Brummel, S. G. Souter and E. Staychock. 2011. Community wildfire protection planning: Is the Healthy Forests Restoration Act's vagueness genius? **In Press**.
- Janssen, M. A., O. Bodin, J. M. Anderies, T. Elmqvist, H. Ernstson, R. R. J. McAllister, P. Olsson, and P. Ryan. 2006. Toward a network perspective of the study of resilience in social-ecological systems. *Ecology and Society* **11(1)**:15.
- Kesby, M. 2007. Spatialising participatory approaches: The contribution of geography to a mature debate. *Environment and Planning A* **39(12)**:2813-2831.
- Kolb, D. A. 1984. *Experiential learning: experience as the source of learning and development*. Prentice Hall, Englewood Cliffs, New Jersey.
- Lamont, M. and V. Molnar. 2002. The study of boundaries in the social sciences. *Annual Review of Sociology* **28**:167-195.
- Leeuwis, C. 2000. Reconceptualizing participation for sustainable rural development: Towards a negotiation approach. *Development and Change* **31(5)**:931-959.

- Li, T.M. 2001. Boundary work: community, market, and state reconsidered. Pages 157-179 in A. Agrawal and C.C. Gibson, editors. *Communities and the environment: Ethnicity, gender and the state in community-based conservation*. Rutgers University Press, New Jersey.
- Liu, Y., J. Stanturf, and S. Goodrick. 2010. Trends in global wildfire potential in a changing climate. *Forest Ecology and Management* **259**(4):685-697.
- Lowndes, V., and C. Skelcher. 1998. The dynamics of multi-organizational partnerships: An analysis of changing modes of governance. *Public Administration* **76**(2):313-333.
- Mandarano, L. A. 2009. Social network analysis of social capital in collaborative planning. *Society & Natural Resources* **22**(3):245-260.
- Margerum, R. D. 1999. Integrated environmental management: The foundations for successful practice. *Environmental management* **24**(2):151-166.
- Margerum, R. D. 2002. Evaluating collaborative planning - implications from an empirical analysis of growth management. *Journal of the American Planning Association* **68**(2):179-193.
- Martin, J., M.S. Feldman, M.J. Hatch, and S.B. Sitkin. 1983. The uniqueness paradox in organizational stories. *Administrative Science Quarterly* **28**(3): 438-453.

- May, P. J., and R. J. Burby. 1996. Coercive versus cooperative policies: Comparing intergovernmental mandate performance. *Journal of Policy Analysis and Management* **15**(2):171-201.
- McCaffrey, S. 2004. Thinking of wildfire as a natural hazard. *Society & Natural Resources* **17**(6):509-516.
- McCloskey, M. 1996. The skeptic: collaboration has its limits. *High Country News* **28**:7.
- McCool, S. F. and K. Guthrie. 2001. Mapping the dimensions of successful public participation in messy natural resources management situations. *Society & Natural Resources* **14**:309-323.
- Mezirow, J. 1991. *Transformative dimensions of adult learning*. Jossey-Bass, San Francisco, California.
- Mezirow, J. 1994. Understanding transformational theory. *Adult Education Quarterly* **44** (4):222-232.
- Mezirow, J. 2003. Transformative learning as discourse. *Journal of Transformative Education* **1**(2):58-63.
- Mostert, E., C. Pahl-Wostl, Y. Rees, B. Searle, D. Tàbara, and J. Tippett. 2007. Social learning in European river-basin management: barriers and fostering mechanisms from 10 river basins. *Ecology and Society* **12**(1):19.

- Murdoch, J. 2001. Ecologising sociology: Actor-network theory, co-construction and the problem of human exemptionalism. *Sociology-the Journal of the British Sociological Association* **35**(1):111-133.
- Muro, M. and P. Jeffrey. 2008. A critical review of the theory and application of social learning in participatory natural resource management processes. *Journal of Environmental Planning and Management* **51**(3):325-344.
- National Research Council (NRC), 1996. Understanding risk: Informing decisions in a democratic society. P.C. Stern and H.V. Fineberg, editors. National Academy Press, Washington D.C.
- Nelson, K. C., M. C. Monroe, J. F. Johnson, and A. Bowers. 2004. Living with fire: Homeowner assessment of landscape values and defensible space in Minnesota and Florida, USA. *International Journal of Wildland Fire* **13**(4):413-425.
- Nelson, K. C., M.C. Monroe, and J. Fingerman Johnson. 2005. The look of the land: homeowner values, actions and defensible space landscapes in Minnesota and Florida. *Society and Natural Resources* **18**:321-336.
- New South Wales Department of Environment, Climate Change, and Water (NSW DECCW). 2010a. The Atlas of NSW Wildlife. Available from <http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp> (Accessed June 2010).

New South Wales Department of Environment, Climate Change, and Water (NSW DECCW). 2010b. Threatened Species, Populations, and Communities of NSW. Available from <http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx> (Accessed June 2010).

New South Wales Rural Fires Act, 1997. Accessible at (http://www.austlii.edu.au/au/legis/nsw/consol_act/rfa1997138/) (Accessed August 2010).

Newman, L., and A. Dale. 2005. Network structure, diversity, and proactive resilience building: A response to Tompkins and Adger. *Ecology and Society* **10**(1):resp2.

O'Laughlin, J. 2005. Policy issues relevant to risk assessments, balancing risks, and the national fire plan: Needs and opportunities. *Forest Ecology and Management* **211**(1-2):3-14.

Ostrom, E. 1990. *Governing the commons: the evolution of institutions for collective action*. Cambridge University Press, New York, New York.

Pahl-Wostl, C., and M. Hare. 2004. Processes of social learning in integrated resources management. *Journal of Community & Applied Social Psychology* **14**(3):193-206.

- Pausas, J. G., and J. E. Keeley. 2009. A burning story: The role of fire in the history of life. *Bioscience* **59**(7):593-601.
- Petts, J., and C. Brooks. 2006. Expert conceptualisations of the role of lay knowledge in environmental decisionmaking: Challenges for deliberative democracy. *Environment and Planning A* **38**(6):1045-1059.
- Petts, J. 2007. Learning about learning: lessons from public engagement and deliberation on urban river restoration. *The Geographical Journal* **173**(4):300–311.
- Phillips, L. and M.W. Jorgensen. 2002. *Discourse analysis as theory and method*. Sage Publications, Thousand Oaks, CA.
- Pickering, A. 1996. Further beyond the society/nature divide: a comment on Freudenberg, Frickel, and Gramling. *Sociological Forum* **11**:151-57.
- Pitman, A. J., G. T. Narisma, and J. McAneney. 2007. The impact of climate change on the risk of forest and grassland fires in Australia. *Climatic Change* **84**(3-4):383-401.
- Pretty, J., and D. Smith. 2004. Social capital in biodiversity conservation and management. *Conservation Biology* **18**(3):631-638.
- Pyne, S. J. 1982. *Fire in America: Cultural history of wildland and rural fire*. University of Washington Press, Seattle, Washington.

Pyne, S. J. 1991. *Burning bush: a fire history of Australia*. University of Washington Press, Seattle, WA.

Quadrennial Fire Review (QFR). 2009. Available from

<http://www.nifc.gov/QFR/QFR2009Final.pdf> (Accessed July 2010).

Radeloff, V. C., R. B. Hammer, S. I. Stewart, J. S. Fried, S. S. Holcomb, and J. F.

McKeefry. 2005. The wildland-urban interface in the United States. *Ecological Applications* **15**(3):799-805.

Reagans, R., and B. McEvily. 2003. Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly* **48**(2):240-267.

Rodriguez, C., A. Langley, F. Beland, and J. L. Denis. 2007. Governance, power, and mandated collaboration in an interorganizational network. *Administration & Society* **39**(2):150-193.

Rossiter, N. A., S. A. Setterfield, M. M. Douglas, and L. B. Hutley. 2003. Testing the grass-fire cycle: Alien grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* **9**(3):169-176.

Ruef, M. 2002. Strong ties, weak ties and islands: Structural and cultural predictors of organizational innovation. *Industrial and Corporate Change* **11**(3):427-449.

- Sandstrom, A., and L. Carlsson. 2008. The performance of policy networks: The relation between network structure and network performance. *Policy Studies Journal* **36(4):497-524.**
- Schively, C. 2007. A quantitative analysis of consensus building in local environmental review. *Journal of Planning Education and Research* **27(1):82-98.**
- Schneider, M., J. Scholz, M. Lubell, D. Mindruta, and M. Edwardsen. 2003. Building consensual institutions: Networks and the national estuary program. *American Journal of Political Science* **47(1):143-158.**
- Schusler, T. M., D. J. Decker, and M. J. Pfeffer. 2003. Social learning for collaborative natural resource management. *Society & Natural Resources* **16(4):309.**
- Selin, S., and D. Chavez. 1995. Developing a collaborative model for environmental-planning and management. *Environmental management* **19(2):189-195.**
- Simmons, D. and Adams, R. 1986. Fuel dynamics in an urban fringe dry sclerophyll forest in Victoria. *Australian Forestry* **49:149-54.**
- Sims, L. and A.J. Sinclair. 2008. Learning through participatory resource management programs: case studies from Costa Rica. *Adult Education Quarterly* **52(2):151-168.**
- Steelman, T. A., and C. A. Burke. 2007. Is wildfire policy in the United States sustainable? *Journal of Forestry* **105(2):67-72.**

- Stephens, S. L., and L. W. Ruth. 2005. Federal forest-fire policy in the United States. *Ecological Applications* **15**(2):532-542.
- Sturtevant, V., M. Moote, P. Jakes, A. Cheng. 2005. Social science to improve fuels management: a synthesis of research on collaboration. General technical report NC-257. USDA Forest Service, Northern Research Station.
- Syphard, A. D., V. C. Radeloff, J. E. Keeley, J.F. Hawbaker, M.K. Clayton, S.I. Steward, and R.B. Hammer. 2007. Human influence on California fire regimes. *Ecological Applications*, **17**(5):1388–1402.
- Taylor, B. D., and L. Schweitzer. 2005. Assessing the experience of mandated collaborative inter-jurisdictional transport planning in the United States. *Transport Policy* **12**(6):500-511.
- Tewdwr-Jones, M., and P. Allmendinger. 1998. Deconstructing communicative rationality: A critique of Habermasian collaborative planning. *Environment and Planning A* **30**(11):1975-1989.
- The Nature Conservancy (TNC), 2010. Our initiatives: Fire and conservation. Available through <http://www.nature.org/initiatives/fire/> (Accessed September 2010).
- Thompson, G., J. Frances, R. Levacic and J. Mitchell (eds.). 1991. *Markets, hierarchies and networks: the coordination of social life*. London: Sage.

- Tompkins, E. L., and W. N. Adger. 2004. Does adaptive management of natural resources enhance resilience to climate change? *Ecology and Society* **9**(2):10.
- USDA and USDI, 2001. Urban–wildland interface communities within vicinity of federal lands that are at high risk from wildland fire. *Federal Register* **66**, 751–777.
- Victorian Bushfires Royal Commission, 2010. The 2009 Victorian bushfires commission final report. Available from <http://www.royalcommission.vic.gov.au/Commission-Reports/Final-Report> (Accessed September, 2010).
- Wasserman, S. and K. Faust. 1994. *Social network analysis: Methods and applications*. Cambridge University Press, New York, New York.
- Whelan, R. et al. 2003. Scientists say: 'beware of simplistic conclusions about fires', Victorian National Parks Association. *Cited in* Whittaker, J., and D. Mercer. 2004. The Victorian bushfires of 2002-03 and the politics of blame: A discourse analysis. *Australian Geographer* **35**(3):259-287.
- Whittaker, J., and D. Mercer. 2004. The Victorian bushfires of 2002-03 and the politics of blame: A discourse analysis. *Australian Geographer* **35**(3):259-287.
- Williams, J. E., and D. A. DellaSala. 2004. Special section: Wildfire and conservation in the western United States - introduction. *Conservation Biology* **18**(4):872-873.

Wondolleck, J. and S. Yaffee. 2000. Making collaboration work: lessons from innovation in natural resource management. Island Press, Washington D.C.

Appendix 1: Interview Guide for US Wildland Fire Planning Groups

CWPPs: Enhancing Collaboration & Building Community Capacity Joint Fire Science Program Interview Protocol

Key Informant Interview Questions

1. How long have you lived in this community?
Ice breaking question and context.

Note: when we use “you” we mean the person being interviewed. When we use “team” we mean the group who developed the CWPP.

2. Have you been involved in fire planning or other types of resource planning?
In what way?
Prompt: pre-CWPP fire planning (for example, Applegate Fire Plan), Firewise, Fire Safe Council, 911-planning

We’re going to be talking to you about the community wildfire protection planning process in [community], but would first like to understand the community better.

3. Can you share with me some examples of how has this community has worked or not worked together to address...
 - a. environmental issues?
 - b. wildfire issues?
Prompt: other wildfire planning activities, codes or regulations addressing fire safe building materials, community clean-up days for getting rid of brush and other fuel, neighborhood design requirements for access or water availability...

Note actions taken by the community vs. individuals. By local government vs. agencies/organizations.

If they cannot come up with any examples or describe a lack of working together ask... Are there barriers that keep the community from dealing with these issues? Can you give me some examples?

4. Going into the CWPP process, how was the wildfire problem understood within the community?

Note: reasons may be classified as ecological, social, and institutional causes and/or consequences.

5. What government and non-government organizations or groups are involved in wildfire in the community?
 - a. Can you give me some examples of how they are involved?
 - b. Have you seen examples of these groups working together to solve problems?

Note: you might get some of this information in #3, but we want to be sure we get information on networks/networking, linkages between groups.

Now we're going to talk about [community's] community wildfire protection process

6. Tell me about how the CWPP process was initiated in your community.

*Note: Some of the questions to be answered during this dialogue:
How did the CWPP process get started in [community]?
How were people brought into the CWPP process?
How and why did you become involved?*

7. Who were the major players in the CWPP process?
 - a. Why were they major? What was their role?
 - b. What resources did they bring to the process?
 - c. How did they work with other members of the team? (*relationships*)
 - d. If this person was not part of the process, how would the plan have been different?

*Note, we're looking for how people fit together, how they were connected.
Prompt for whether some participants took a greater role than others. Did the Team hire a consultant? Who were the leaders? Intermediaries?
May want to use a concept map to see how people were connected.*

8. Did the Team follow a pre-existing template for developing the Plan?

If yes ask...

- a. Where did the template come from?
- b. Did the Team modify the template or use it as is?

If no ask...

- c. How did the Team design the Plan?

9. Did the Team define specific goals and/or objectives for the Plan?

If yes ask...

- a. Did the Team have difficulty agreeing on goals?
- b. Did the Team's goals change over time?

If no ask...

- c. Why not?
- d. Were there barriers to developing goals or objectives? Could you provide some examples?

10. Did the Team have rules for making decisions? How did the Team reach agreement/consensus?

If yes ask...

- a. Please give me an example of how this worked.

If no ask...

- b. Was it difficult to make decisions? Can you give me an example?

11. (Did the team try to define the WUI? If so how?) Tell me about how the Team defined the WUI. What factors went into deciding where to draw the line?

- a. Who were the major participants in defining the WUI?
- b. Land ownership?**
- c. Availability of information?**
- d. Housing density**
- e. Fire ecology/history**

May be useful to look at the map in the Plan during this discussion. Note what benefits came into play, if land ownership, the impact of fuel loads, availability of information, and funding and/or interpretation of the law played a role in where the line was drawn.

12. Tell me about how the Team prioritized fuel reduction activities.

May be useful to have before you the list of treatments identified. Look for the impact of ownership, location, previous fires, and different benefits on prioritization. The funding/interpretation piece may come into play here as well.

13. What was/were the most critical resource, tool, or information the Team needed to develop the CWPP?

- a. Was the information/resource/tool hard to get?

- b. Who provided the information/resource/tool?
- c. Was the tool easy to use? How could it have been improved?
- d. Were there any gaps in information?
- e. What additional information/resources/tools does the Team wish they had to fill those gaps?

Note: Be sure that for every tool they mention, questions a-c were addressed.

- 14. How did the Team share information during the CWPP process...
 - a. within the Team?
 - b. with the broader community?

CWPP Outcomes

- 15. Through the CWPP process, did the Team come to a shared understanding of the wildfire problem in [community]?
 - a. How would you describe this shared understanding of the problem?
 - b. Were there any activities/events/projects that were particularly effective in developing this shared understanding?

We're looking for a common understanding of the causes and consequences of the wildfire risk in [community]? This is a question about coming to a common understanding of how the issue is framed.

- 16. To what extent did relationships between individuals or organizations/agencies/groups change during the CWPP process? Can you give me some examples?
 - a. Do you think that these new/changed relationships will affect interactions beyond the CWPP process? Why? How?
 - b. Can you give me some examples of how these new relationships may help the community accomplish other objectives?

- 17. Thinking back over the process, what were some lessons the Team learned that would be helpful to other communities involved in CWPP?

For example, is there something they would have done differently? What was critical to their success? What was your biggest challenge?

- 18. Do you think the larger community's (e.g., community members not involved in the planning process) understanding of the wildland fire problem has changed as a result of the plan?

If yes...

a. Can you give me some examples that would be evidence of this change?

If no...

b. Why not?

Note: Go to understandings defined in #4 and ask about change in relation to these.

19. Federal policy encourages the development of CWPPs as a way to address the following four goals:

- *reducing fuels*
- *restoring forests*
- *private property responsibility of fuels management*
- *improving wildfire suppression efforts.*

a. Does your plan address these four goals? How?

b. How does the plan address [state's] goals/concerns about wildfire?

c. How does the plan address the (county's) goals/concerns about wildfire?

Note—we're trying to get an idea about the importance of scale and how issues and plans are nested.

20. What do you feel was the most significant outcome of your plan?

21. Has your community begun implementing your plan?

If yes ask...

a. What have been the biggest challenges to implementing the plan?

If no ask...

b. What do you think will be the biggest challenges to implementing the plan?

22. Can you think of anything we haven't covered that you experienced in the development of CWPP process that you think might be of interest to other communities, agencies or policy makers?

Any additional topics to cover or comments you would like to make to help us better understand CWPP planning?

Appendix 2: Interview Guide for Australian Bushfire Planning Groups

Examining Collaborative Bushfire Planning and Policy in New South Wales and Northern Territory, Australia

Context: Setting the Stage

1. How long have you lived in this area?
 - a. What brought you here?
2. How long have you been involved in bushfire issues?
 - a. In what capacity?
 - b. How does your current position involve bushfire issues?
3. Tell me about this area, the planning area.
 - a. Is it unique or special in any way?
 - b. Or is it similar to other parts of New South Wales?
 - c. What about in terms of fire risk?
 - d. What about in terms of biodiversity or natural resources?
4. What government and non-government organizations or groups are involved in wildfire in the community?
 - a. Can you give me some examples of how they are involved?
 - b. Have you seen examples of these groups working together to solve problems?
5. Can you tell me a little bit about how you think people living in the area view wildfire?
 - a. Particularly in terms of the causes, consequences, and management?
6. How long have you been a member of this wildfire planning group?
7. Coming into this planning process, what was your primary interest in bushfire and bushfire management?
8. Tell me a little about bushfire management in your area.

- a. What do you see as the primary causes of bushfire?
 - b. What do you see as the consequences of bushfire in the area?
 - c. Do you view bushfire as a “natural” aspect of life in this area?
 - Why or why not?
9. What do you think were other members’ primary interest in bushfire and bushfire management coming into the BFMC process?
10. When you first started this past planning process, what do you think the rest of the group saw as
- a. The primary causes of bushfire?
 - b. The primary consequences of bushfire in the area?
 - c. If they view bushfire as a “natural” aspect of life in this area?
 - Why or why not?

Process:

11. Tell me about how the planning process was initiated in your community.
- a. How were people brought into the process?
 - b. How and why did you become involved?
12. Who were the major players in the planning process?
- a. Why were they major? What was their role?
 - b. What resources did they bring to the process?
 - c. How did they work with other members of the team? (*relationships*)
 - d. If this person was not part of the process, how would the plan have been different?
 - e. Was there any individual or group that wasn’t involved in the planning process that you thought should have been?
13. Did the Team define specific goals and/or objectives for the Plan?

If yes ask...

- a. Did the Team have difficulty agreeing on goals?

If no ask...

- b. Why not?
- c. Were there barriers to developing goals or objectives? Could you provide some examples?

14. How did you make decisions as a group?
- Did you have rules for making decisions?
 - Did you ever have difficulty making decisions?
15. What tools, activities or events were most helpful in aiding the planning process?
- Was the information /resource/tool hard to get?
 - Who provided the information/resource/tool?
 - Was the tool easy to use?
 - How could it have been improved?
 - Were there any gaps in information?
 - What additional information /resources/tools does the Team wish they had to fill those gaps?
16. What information was most important for helping the group make decisions?
- Who brought that information to the process?

Pull out specific examples from things mentioned in question 16 for question 17.

17. How did you use some of that more technical or scientific information in the planning process?
- Can you give me an example?
 - Was there any information that people questioned or that was controversial?
18. The planning area you were presented with: did the boundaries of those areas make sense to you and the rest of the group?
- Why or why not?
 - Pull out specific examples from their planning are: protected areas, ecological boundaries, etc and ask...***
 - What about boundaries around who was to be involved in making the plan?
 - What about decisions regarding who was going to complete what aspects of the planning process?
19. *Ask a specific question dependent upon the content of the plan such as “Why did the group decide to put that fuel break there?”*
20. From the beginning of the planning process to the end, did you become more certain or less certain of the decisions you were making?
- Why?

21. Who wrote your group's bushfire management plan?
- Was that something that was decided as a group?
 - Did they use a template or other documents to guide the plan structure and content?

Outcomes

22. Has your personal knowledge or understanding of bushfire changed through the process?
- Especially in terms of causes, consequences, and management?
 - How has it changed?
 - How might you explain bushfire, its causes, consequences, and management to another person?
23. Has your understanding of other participants' perspectives about wildfire changed through the process (y/n)?
- If so, in what way?
 - If not, why not?
 - Do you have a different understanding of *why* others think what they do?
24. Through the process, did you gain a better or worse understanding of how your objectives and perspectives in relation to the rest of the group?
- Did you realize others' objectives are more similar or more different after your participation?
 - Can you tell me a little more about that?
25. Did the group come to a shared understanding of the bushfire issue and bushfire management through the planning process?
- How would you describe that understanding?
 - What parts of the process or activities were most helpful in bringing the group to a shared understanding?

26. To what extent did relationships between individuals or organizations/agencies/groups change during the planning process? Can you give me some examples?
- a. Do you think that these new/changed relationships will affect interactions beyond the planning process? Why? How?
27. What are the strongest emphases of this plan?
- a. How would you rank these objectives in terms of how well your plan addresses them?
 - Fuels reduction
 - Conservation/restoration
 - Protection of life and property
 - Fire suppression
 - Emergency Response
28. Thinking back over the planning process, did the Team's planning goals change over time or did they stay the same from the beginning?
29. Have you started to implement any parts of your plan?
- a. Who has been implementing?
 - b. If not, what do you think will be most important to do first?
 - c. Do you anticipate any barriers or challenges to implementation?
 - d. Could you give me an assessment of how important collaboration is to the success or failure of implementing this process?
30. After participating in this planning process, do you think you are more or less likely to participate in (or even initiate) group processes such as this in the future?
- a. Would you recommend a group approach to others?
31. What is the most significant outcome of this plan or planning process?
32. Can you think of anything we haven't covered that you experienced in the development of CWPP process that you think might be of interest to other communities, agencies or policy makers?

Any additional topics to cover or comments you would like to make to help us better understand CWPP planning?

Appendix 3: Social Network Data Collection Matrix

Collaborative Bushfire Planning Research Project

• Post-Interview Relationships Survey

The next set of questions is about your relationships with people in your bushfire planning group and with your colleagues not participating in the planning process. In particular, I am asking:

- 1) Through the planning process, whether your working relationships changed with those participating in the bushfire group and those close colleagues not in the bushfire group.
- 2) Whether knowledge or learning happening within the planning process may extend to your close colleagues that are not participating.

In **column A** are the names of the people that participated in your bushfire group. In the final spaces, please write in the names of five people with whom you frequently talk with or work with on bushfire or land management matters.

In **column B**, please indicate how frequently you communicated about bushfire with each person **before** your participation in this most recent bushfire planning process.

In **column C**, please indicate the ways that you interacted with each person listed **during** the planning process. Interactions can be related either directly to the planning process or not related to the planning process at all.

Please feel free ask me any questions you have or any clarifications you would like.

A. Person's First and Last Name	B. Before Beginning this planning process , how often did you communicate about bushfire with this person?	C. During this planning process , how often did you communicate with this person about bushfire?	D. After Completing this planning process , how often have you communicated about bushfire with this person?
1.	<input type="checkbox"/> Never <input type="checkbox"/> Sometimes <input type="checkbox"/> Frequently	<input type="checkbox"/> Never <input type="checkbox"/> Sometimes <input type="checkbox"/> Frequently	<input type="checkbox"/> Never <input type="checkbox"/> Sometimes <input type="checkbox"/> Frequently
2.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
3.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
4.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
5.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
6.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
7.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F
8.	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F	<input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> F