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PRIVATE PROPERTY OWNER REGARD OF HAZARD FUEL MITIGATION IN
THE WILDLAND URBAN INTERFACE

By

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Thesis

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for the degree of

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in Resource Conservation

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Private Property Owner Regard of Hazard Fuel Mitigation in the Wildland Urban Interface

Chairperson: James Burchfield

Abstract.

The objective of this research was to document and to analyze private property owner reasons and justifications for implementing, or not, the fire prevention effort of hazard fuel mitigation. Semi-structured in-depth interviews were conducted with 42 property owners in the forest proximate community of Seeley Lake, Montana. Using an interpretive approach and grounded theory methodology, the content analyses of transcribed interviews was completed for the purpose of capturing the variations in WUI property owner behaviors and viewpoints on hazard fuel mitigation. The property owners provided diverse reasons and nuanced justifications for their decisions. Hazard fuel mitigation was often undertaken for incentives outside of risk reduction and the protection of property from a future wildland fire. These incentives included enhancing the aesthetic appearance to a property and dealing with general hazards from a mountain pine beetle infestation. In relation to hazard fuel mitigation, property owners spoke about values that included personal responsibility and stewardship. The property owners who did not implement hazard fuel mitigation can be divided into two categories. There were individuals who wanted to undertake mitigation but barriers - physical ability, time, and costs - prohibited participation. Other individuals did not want to engage in hazard fuel mitigation. Since for them, altering the existing vegetation provided little protection in the event of wildland fire and treatments would lead to unwanted outcomes including a loss of privacy and a change in appearance to their forested property.

Dedication, Vita, Acknowledgements

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CHAPTER I

INTRODUCTION

WILDFIRE AND THE WILDLAND URBAN INTERFACE

The wildland urban interface is a complex setting that has implications and repercussion to social, economic, and political decisions at local, regional, and national levels. The wildland urban interface (WUI) is where homes and others structures are built adjacent to or within tracts of flammable vegetation (USDA & USDI, 2001). Housing development in or near wildland vegetation is widespread: about one-tenth of the area and one-third of the housing units of the conterminous United States are located in the WUI (Radeloff et al., 2005). In the Rocky Mountains and the Southwest, nearly every urban area is surrounded by WUI. This medium to low density housing near low-elevation forested area reflects several decades of sprawling housing development connected to these urban areas. In addition, the wildland urban interface is frequently located in amenity areas that afford tourism and recreation (Stewart, Radeloff, & Hammers, 2006). Development within the WUI has been coupled to amenity mitigation, which can be regarded as individuals choosing to live closer to locales that offer scenic views and recreational opportunities (Kruger, Manna, & Strifel, 2008). Amenity mitigation was found to be prevalent in the mountains of the West and Southwest, coastal areas, and lands in proximity to national forest, national parks, or other public lands (English, Marcouiller, & Cordell, 2000).

Among the many challenges posed by amenity migration and development of the WUI are the potential impacts of wildland fire. In 2011 alone, a total of 5,246 structures were destroyed by wildland fire located in the urban interface. This included 3,459

residences, 1,711 outbuildings, and 76 commercial structures (NIFC, 2012). Social science research has documented wildland fire as a detrimental and impacting event to the residents and to the communities located in the WUI (Carroll & Cohn, 2007; Carroll, Cohen, Seesholtz, & Higgins, 2005; Rodriguez-Mendez, et al 2003; Halvorson, 2002).

The wildland urban interface fire affects not only the residents of a particular locale but also the regional and national land management agencies and local fire departments tasked with the financial costs and the resources - personal and equipment - necessary to control a wildland fires (Winter & Fried, 2001). In 2010 at the request of Congress, an independent panel reviewed the suppression costs of any wildland fire that exceeded \$10 million in expenditure. With the U.S. Forest Service serving as the lead agency in the review, the primary purpose of the review “to determine whether agency personnel made prudent and cost effective incident management decisions in light of risk management considerations” (USDA, 2010). One key finding of the review addressed structures and homes built in fire prone environments:

Protecting communities and community infrastructure significantly increased fire suppression costs on five of the six wildfires reviewed. The need to protect homes, non-residential structures in the wildland-urban interface (WUI), and other high value built infrastructure, limited flexibility in decision-making on some incidents, and has led agency and incident personnel to adopt higher cost strategy alternatives and tactics. In some cases, even small numbers of homes threatened by the fire significantly affected fire suppression strategies, tactics, and costs (p. 57).

Equally significant, commercial and residential development within the wildland urban interface limit the options land managers have in utilizing prescribed fire as a tool for dealing with unnatural fuel loads that are the result of past fire suppression policies (Kruger et al., 2008). The Angeles National Forest in southern California is limited to implementing, at a given time, only 100-acre prescribed fire due to strict air quality

regulations within the state (USDA, 2010). For such locations, the use of prescribed fire at such scale precludes achieving any significant reduction in fuel loads within a reasonable timeframe.

At the present, hazard fuel mitigation by mechanically removing vegetation is regarded as a practical option to deal with protection of valuable infrastructure. A component to WUI hazard fuel mitigation is the treatment of privately owned lands. What is not completely clear is private property owner regard for the implementation of this fire prevention effort. The reason individuals engage in the activity of hazard fuel mitigation is largely unknown. This exploratory study will examine the behaviors and viewpoints of private property owners in regard to hazard fuel mitigation in the forest proximate community of Seeley Lake, Montana.

OBJECTIVES

There are two objectives for this research that are guided by the central thesis question: What are private property owner views and behaviors about the fire prevention measure of hazard fuel mitigation in the forest proximate community of Seeley Lake?

- i.** Document and analyze private property owner reasons and justifications for implementing, or not, the fire prevention effort of hazard fuel mitigation. Uncover any patterns and variations between the groups and types of property owners.

- ii.** Identify opportunities for land use management agencies to encourage hazard fuel mitigation based on the insights of the justifications for treatments provided from the grounded theory study of wildland urban interface property owners.

RESEARCH QUESTIONS

i. What were the reasons and justifications property owners provided for implementing hazard fuel mitigation on their property? What were the reasons and justifications property owners provided for not implementing hazard fuel mitigation on their property? What were the patterns and variations between these reasons and justifications stated by property owners?

ii. Seeley Lake has experienced several large wildland fires over the past decade. Most recent was the 30,000-acre Jocko Lakes fire during the summer of 2007. What influence might experiencing a wildland have on undertaking, or not, hazard fuel mitigation?

iii. For property owners who had undertaken hazard fuel mitigation, what were barriers they encountered in this process? Might these barriers be issues that can be resolved?

iv. What were some possible unexpected benefits to the hazard fuel mitigation work? Might these benefits entice property owners into considering the implementation fuel mitigation?

v. Were there any unexpected negative outcomes to fuel mitigation work? Might these outcomes affect the decision making of other property owners who are considering fuel mitigation work on their property?

ORGANIZATION OF THESIS

This thesis is organized into five subsequent chapters. Chapter Two contains a literature relevant to this project. This literature includes current wildfire research highlighting efforts to understand the social dimensions of wildland fire and hazards research relevant to the wildland urban interface setting.

Chapter Three explores the contextual information on the forest proximate community of Seeley Lake, Montana. Also examined will be the past forest and fire management practices plus the commercial and residential development, which have contributed to wildfire risk in the study area. The formation of the Seeley-Swan Fire Plan and mitigation options that are available to private property owners are expanded upon in this section.

The methodology is presented in Chapter Four. The chapter will present the interpretive approach to the social science research and the methodology of grounded theory, which were used in this project. The choice of Seeley Lake as the research location, the selection of participants for the research, interview procedures, and a description of data analysis are outlined in this chapter. Information on the experience, challenges, and obstacles related to the data collection and data analysis are noted at the conclusion of the chapter.

Chapter Five contains the findings section, which includes direct quotes from the interviews. Direct quotes are used to help illustrate the major themes that emerged from the research. Chapter Six is a discussion of present finding in relation to past social science research on wildfire and private property ownership in the wildland urban interface. Also discussed are the policy implications and future research endeavors.

CHAPTER II

LITERATURE REVIEW

The first part of this chapter will provide information on wildland urban interface and wildfire prevention measures that are specifically related to this research project. Providing background information will allow for clarity and common language for the remaining portions of this project. The second portion of the chapter will review current wildfire research, highlighting recent efforts in understanding the social dimension of wildland fire with a focus on community level response and planning. An examination of wildland fire as a natural hazard, including a look at risk perception literature and the acceptance of mitigation programs at the property owner level will follow. Closing the chapter will be an outlook on future research.

BACKGROUND

The wildland urban interface

The wildland urban interface (WUI) is the physical location where homes and other structures are built adjacent to or within tracts of flammable vegetation (UDSA & USDI, 2001). The location of the WUI is often the site where public lands and private lands literally interface. Public lands within the WUI include federal, state, county, and city open space lands. Private lands may be developed residential, undeveloped residential, or undeveloped private agriculture lands. Developed parcels are defined as having structures while undeveloped parcels are tracts of land with no structures (Radeloff, et al., 2005).

Literature on fire and land management often divides the urban interface into three categories based upon distinct demographic characteristics and fire management

concerns. As described by Davis (1990) the *classic* interface is urban sprawl, an area where subdivisions meet the wildlands. A wildland fire in this area can threaten and impact numerous homes. The structure density combination of fuels, weather, and topography, can overwhelm firefighting resources. The *intermix* is typically single homes and structures scattered throughout the wildland area. Large tracts of vegetation often surround these isolated structures. During a wildland fire, these individual homes and structures are difficult to protect, most often due to size and intensity of the surrounding fire. Areas of wildland vegetation within existing urban areas characterize the *isolated* interface. An example is the natural parks location within some cities. Other locations may have private lands with acreage that is yet to be develop or cannot be developed due to zoning regulations. A wildland fire started in isolated interface can impact other adjacent developed properties.

In United States nearly 10% of all land is classified as the WUI with all 50 states have urban interface. A few states have nearly three-quarters of their land designated as WUI (Stewart et al., 2006). Using the housing densities definitions of the *classic* and *intermix* interface plus a 2.5-km-community protect zone buffer Schoennagel, Nelson, Theobald, Carnwath, and Chapman (2009) mapped the WUI for the United States. 71% of the urban interface was designated as being in private ownership. The remaining 29% is public land: federal land (17%), state land (4%), Native American tribal land (6%), and local government (1%).

Looking to produce information helpful to fire and land management practitioners, Theobald and Romme (2007) mapped the location and extent of the hazard conditions in wildland urban. They produced an estimation of conditions by combining

U.S. Census data on housing density classes with specific forest types defined by their fire severity. The designation of *high* severity references forest with vegetation types in which stand-replacing fires dominate both historical and recent fire regimes. An example of a high severity fire regime is the lodgepole pine forests of Yellowstone National Park. *Low* severity is applied to locations where fuels and climate foster mostly low-intensity fires. Hardwood aspen-birch forests are an example of low severity vegetative type. *High (historically low or variable)* applies to vegetation types in which fires historically were of low or variable intensity but recently have burned with high intensity because of fire exclusion. An example is the ponderosa pine forest of the southwestern United States. In comparison to Schoennagel et al. (2009), Theobald and Romme (2007) mapped 89% of the WUI as privately owned lands. From 1970 to 2000 the WUI had expanded by 52% with 12.5 million housing units currently in this proximity. The expansion to the urban interface is predicted to be greatest in the intermountain west states. In addition, 65% of the WUI were mapped in high or high (historically low or variable) severity fire regime classes. In the West, 90% of the WUI occurs in high and high variable severity forest fire regimes. Most striking, nationwide only 7% of WUI in high severity fire regimes occurs on public lands.

Regardless of methodology, several mapping projects have revealed privately owned land to be the major component to the wildland urban interface. In order to achieve hazard risk mitigation in the WUI, forest management and fire protection will have to continue to be implemented on privately owned lands.

Fire prevention, defensible space, and fuel mitigation

The National Wildfire Coordinating Group (NWCG) is made up of the USDA Forest Service; four Department of the Interior agencies: Bureau of Land Management (BLM), National Park Service (NPS), Bureau of Indian Affairs (BIA), and the Fish and Wildlife Service (FWS) and State forestry agencies through the National Association of State Foresters. The purpose of NWCG is to coordinate programs of the participating wildfire management agencies so as to avoid wasteful duplication and to provide a means of constructively working together (NWCG, 2011). A short list of common terminology regarding wildfire and related issues will be presented and used throughout this work.

According to the National Wildfire Coordinating Group, fire prevention are activities such as public education, community outreach, law enforcement, engineering, and reduction of fuel hazards that are intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property, or resources (NWCG, 2011). Fire prevention activities include mitigating hazard fuels to create defensible space around homes and to reduce fire hazards on undeveloped land. Hazard fuels are a fuel complex defined by kind, arrangement, volume, condition, and location that presents a threat of ignition and resistance to control in event of a wildfire (NWCG, 2011).

Defensible space refers to that area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and allow fire fighters to safely operate. Typically, creating a defensible space involves thinning of flammable native trees and shrubs, removing of dead vegetation, and planting of more fire resistant plant materials around the house (NWCG, 2011). The slope of a building site is an essential consideration in the size of defensible space needed around structures. The greater the

percent of slope equates to an increase in down slope defensible space requirements (MT DNRC, 1993).

There are engineering aspects coupled to defensible space and hazard mitigation in the WUI. Specific considerations encompass having clear and maintained roads for egress and accesses, providing adequate water for firefighting resources, and using fire-resistant materials and designs for homes and outbuildings (MT DNRC, 1993). Hazard fuel mitigation is one component to defensible space and private property protection in the WUI.

Research on wildfire, structure protection, and the urban interface

Research utilizing structure ignition modeling (Cohen & Butler, 1988), field experiments (Alexander et al., 1998), and post-fire case studies have examined structure ignition (Maranghides & Mell, 2009). Together these studies indicated that materials immediately surrounding a structure serve as the source of structure ignition during a wildfire. Regardless of size, intensity, or spread rate of a wildfire, the potential for a structure to ignite is dependent on the presence of fuels, including vegetation, structures, and other combustible materials. Additionally, research has found ignition occurs when flames and firebrands are within 40 meters of a structure (Cohen, 2000). The distance from a structure of both flammable vegetation and other combustible materials is critical for fire protection. Defensible space management addresses the attempt at fire protection around structures in the WUI. Hazard fuel mitigation tackles the vegetation management portion of defensible space.

As previously examined, the WUI is often a combination of private land surrounded or intermixed with undeveloped public lands. Research has explored hazard

fuel mitigation around private property versus other fuel mitigation options, such as, the treatment of public lands for risk reduction. Cohen (2001) and Nowicki (2002) suggest with the spatial scale determining structure ignition, emphasis for fuel mitigation should be targeted to home and to community sites rather than peripheral treatment of the WUI surrounding landscape. The research work of Stockman (2006), utilized computer modeling and economic analysis to assess fuel mitigation treatments immediately surrounding structures versus prescribed fire and silvicultural forest treatment to lands at a distance of 1.5 miles. Both treatments were estimated to be effective in reducing wildfire hazard, however, treatments directly around structures were found to be more cost efficient.

Implications of forest fuel conditions climate change on wildfire

In many locations, the past management practice of fire suppression on lands under county, state, and federal management has led to unnatural accumulations of fuels and an increased density of forest stands (Pyne, 2001). The size and intensity of many present-day WUI fires are attributed to nearly a hundred years of land management policies that focused on suppression of wildland fires (Carroll, 2007). The work of Westerling, Cayan, Swetnam, and Hidalgo (2006) found climate change to be the cause of increased fire duration and size in mid to high elevation western U.S. forests. Four critical factors – earlier snowmelt, higher summer temperatures, longer fire seasons, and the availability of fuels in forest between 1680 and 2690 meters – have combined to produce the observed increase in wildfire activity. Running (2006) assesses the data from Westerling et al. (2006) with climate prediction models that project June to August temperature increases of 2° to 5°C by 2040-2069 for western North America. The

continuation of large-scale fires and significant burned acreage appears likely for the western United States.

WILDFIRE SOCIAL SCIENCE RESEARCH

Regard for management of public lands

Social science research on wildland fire has focused on public perspectives of fire and forest management strategies for public lands (Burns, Sperry, & Hodgson, 2003). Early work concentrated on homeowner perceptions and attitudes toward fuels management. Particular emphasis was on land management agency use of prescribed fire and mechanical fuel treatments (Gardener, Cortner, & Widaman, 1987; Cortner, Zwolinski, Carpenter, & Taylor, 1984). Earlier research also examined the outreach methods land management agencies might employ with regard to the use and the acceptance of prescribed fire (Taylor & Daniel, 1984).

Recent efforts have continued the investigation into effective communication and outreach efforts for hazard fuel reduction on public lands. Research has examined public attitudes concerning professional land management practices in forests proximate communities. The focus has been on the social acceptability of various practices including wildland fire management, prescribed fire, mechanical thinning, and livestock grazing (Bright, Newman, & Carroll, 2007; Brunson & Shindler, 2004; Kneeshaw, Vaske, Bright, & Absher, 2004).

Response to wildland fire events

With an increase in the severity and proximity of wildland fires to the urban interface, both individual property owner and community reaction to wildfire have been issues of academic inquiry during the past decade. Differences in property owner

response to wildland fire were predicated upon whether individuals experienced personal damages to their property. Homeowners who had lost property in the wildfires blamed the loss on firefighter tactics and past fire management practices of state and federal agencies. Other individuals, who experienced the wildfires without incurring personal property loss, viewed the “cause” of the wildfires to be the result of lightning storms or “an act of God” (Kumagai, Bliss, Daniels, & Carroll, 2004).

Investigation of community response included exploration of community member perceptions of wildland fire risk fire-prone areas (Gordon, Stedman, & Luloff, 2010). Local contextual factors including the sociocultural heritage influenced the meaning of wildland fire and subsequently, the perception of risk. Differences in community response to significant wildfire events were attributed to a combination of physical location, different historical trajectories, and social composition of the communities (Carroll et al., 2005; Rodriguez-Mendez et al., 2003). Local land management agencies and incident management teams tasked with the implementation of disaster response procedures were advised to consider the unique values and views contained within the social context of various WUI communities. The consideration of local views and values taken during a wildland fire would allow for better response to and recovery from significant fire events (Carroll & Cohen, 2007; Carroll et al., 2005).

Community planning and preparedness

In reaction to several high profile wildland fire seasons, academic research has also assessed preparedness on the part of WUI communities. Jakes, Kruger, Monroe, Nelson, and Sturtevant (2007) conducted a series of case studies around 15 wildland urban interface communities across the United States. Researchers identified and

described four criteria - landscape characteristics that include location, vegetative conditions, and attachment to place; government involvement in preparedness planning; contribution of citizen's time, knowledge and skills; and the uniting of community members - that were "key foundational elements" for community wildfire preparedness.

In a similar pursuit, Paveglio, Jakes, Carroll, and Williams (2009) examined the adaptive capacity of wildland urban interface communities. Adaptive capacity is considered the combination of four factors: demographic characteristics, access to scientific and technical knowledge networks, informal interactions/relationships among residents, and place-based knowledge. The melding of these four factors created a unique social context to specific urban interface communities. Property owners in these communities had different approaches to address the creation and implementation of wildland fire protection planning.

Steelman and Kunkel (2004) argued for community response to be a combination of structural and social responses. Structural response included such measures as land use regulations, vegetation management programs, public education, and evacuation plans. Social responses entailed decision-making, organization, management, and planning techniques that helped communities to craft structural responses. Wildland urban interface communities that were successful in creating and implementing mitigation efforts had first paid attention to particular social and political factors. Communities that had developed formal organizations delineating decision-making pathways and assigning personnel to specific tasks were able to plan, executed, and enforce fire prevention efforts.

RISK PERCEPTION

Wildland fire as a natural hazard

Natural hazards research evolved from the discipline of disaster research, which focused on human response to engineering and technologically based tragedies. In an effort to comprehend human response and adaptation, natural hazard research tapped social science to better understand the economic, social, and political ramifications of extreme natural events, such as earthquakes, floods, and tornados (Mileti, 1999).

Response to wildland fire has only recently become a topic of investigation for natural hazard research (McCaffrey & Kumagai, 2007). McCaffrey (2004) suggests the lack of prominence is the consequence of hazard natural developing in the 1960s and 1970s, a time when fire-fighting resources were able to suppress the majority of wildland fires.

Daniel (2007) examines the discrepancy between the natural hazard of wildland fire and the implementation of risk reduction practices undertaken by the public. For fire management professionals, wildland fire is considered as a serious hazard, especially in the urban interface setting. The potential hazards associated with wildland fire deserve public attention and the implementation of fire preventions tactics to avoid personal harm and unwanted, costly outcomes. Daniel (2007) offers several suppositions for the discrepancy between professional proclamations of necessary mitigation work and the public's embrace of these measures. The first deduction is that professional risk psychologists have done little research on the phenomenon of wildland fire. Public perceptions and attitudes related to such events remain unidentified in risk perception literature. This dearth of professional literature stems from wildland fire's relative insignificance when compared to other hazards. In general, natural hazards cause fewer

fatalities than other prominent issues such as, automobile accidents or smoking. Within the field of natural hazards the majority of injuries and fatalities from wildland fire have been to firefighters versus the general population. There have been few high profile incidents demanding protection or safety measures from the public.

The second premise offered by Daniel (2007) concerns the use of technical risk assessments. The damages that have occurred from wildland fire have impacted homes and infrastructure. These statistics on losses and damages to developed property have changed professional risk assessments and emergency management policy. However, the same technical and objective statistics have less of an influence on public perceptions of risk.

Technical risk assessments are computed by professionals and are based upon the potential damages to life and property and the amount of exposure to a particular hazard. The severity of a risk is an estimation calculated by multiplying the probability of a hazard event, by the magnitude of an outcome (Slovic, Fischhoff, & Lichtenstein, 2004a). Most individuals, who are at risk and whose implementation of risk-management activities is essential, do not consider or use technical assessments in their decision-making (Slovic, 1987).

Perceiving risk

Without sufficient data on the hazard perceptions and the subsequent decisions made by individuals who are at risk from wildland fire, a solution offered by Daniel (2007) and McCaffrey and Kumagai (2007) is to utilize more general risk-perception research. Utilizing this research may offer a better understanding of public risk

perceptions of wildland fire. Knowledge from related disciplines could allow for a more nuanced approach both to mitigation outreach efforts and programs.

The work of Fischhoff, Slovic, and Lichtenstein (2004) and Slovic et al. (2004a) examined individual evaluations of risk associated with different activities and technologies. Decisions were based upon the perceived benefits of the technology or activity, how familiar participants were with the technology or activity, and the whether exposure to risks was voluntary or involuntary. Often participants were found to have over- or underestimated the actual risk and risk severity of these activities and technologies. For example, nuclear power and pesticides were regarded as having some degree of perceived benefits but high degrees of risk. The perceived benefit to risk disparity was attributed to these two technologies being unfamiliar, that is not well understood. An accident or unintended exposure could be fatal or catastrophic. In addition, the exposure to the risk was involuntary or not under the control of an individual. In comparison the motor vehicles were rated as having a high degree of perceived benefits as well as a high degree of risk. These high ratings were based upon the use of motor vehicles being a familiar activity, although there was potential for a serious injury or death attendant to the activity. Additionally, the exposure to risk in using a vehicle was viewed as voluntary.

A significant finding in the work of Fischhoff et al. (2004) and Slovic et al. (2004a) is the unpredictability of risk perception to different technologies and activities. There appeared to be no organized relationship between the perceived risks and the benefits of the activities and technologies (Fischhoff et al., 2004). A consistent but not overwhelming relationship was the acceptance of higher levels of risk with greater

benefits associated with a technology or activity. In addition, participants were found to be tolerant of higher levels of risk from activities that were considered voluntary in nature (Fischhoff et al., 2004).

Daniel (2007) attempts to utilize some aspects of general risk-perception research in assessing urban interface residents' regard for wildland fire but admitted extrapolations from general risk-perception research could be erroneous. The unpredictability of risk perception (Fischhoff et al., 2004) seemed to hold for WUI resident and their regard for fire hazards. Winter and Fried (2000) found WUI residents who had direct experience with wildland fire considered forest fires uncontrollable and the resulting damage to residents a random occurrence. Many believed prevention efforts around their home and property was unlikely to provide much protection. Gardner et al. (1987) found residents of southern California communities to believe their exposure to future hazards was reduced even though the surrounding area had recently experienced several wildland fires. The researchers suggested this perception might have been based upon assumptions that fires had reduced vulnerability of the surrounding landscape or the belief that another wildfire was in the same area was an unlikely occurrence.

Acceptance of risk management programs

Associated with perceived risk are the acceptance of risk and the implementation of mitigation measures that are meant to eliminate the risk or lessen the severity of a negative outcome. Much like the variety of factors affecting risk perception, multiple factors influence an individual's decision to undertake risk mitigation efforts (Slovic, 1987). One factor is the tradeoff between the perceived risks and benefits of undertaking mitigation measures. Slovic, Fischhoff, and Lichtenstein (2004b) examined various risk

versus benefit scenarios. Technical risk assessment found a positive correlation between benefits and risks, with individuals more willing to accept greater risk if the benefits were also high. In addition, in situations or settings where benefits are perceived to be high, individuals underestimated the severity of the risks to their present situation (Slovic et al., 2004b).

The costs associated with risk mitigation also influenced individual decision-making. Research from Fischhoff et al. (2004) and Shindler (2007) found people less willing to implement risk reduction activities if costs were high in financial resources, personal efforts, or if the activities caused undesirable alterations to other attributes or values. In addition, the support of wildland fire management programs is dependent upon perceptions of costs versus benefits. Kunreuther and Pauly (2004) examined how even purchasing insurance on low-probability and high loss events was difficult for individuals. Considerable effort was required to think about and locate relevant data. The search for relevant and comprehensible information even discouraged individuals from the purchase of insurance coverage.

Risk mitigation in the WUI – individual property owner decision-making

Early research in wildland fire mitigation assessed individual preference for specific risk reduction programs. Gardner et al. (1987) conducted a mail survey of residents in two communities in Southern California. Residents were reluctant to incur expenses for fire proofing their property. Specific measures included structural modifications to their homes and the clearing of brush near their residences. Their preference was for support of government programs that would provide community

protection through the use of prescribed fire and the creation of “green-belts” to serve as fuel breaks in the protection of residential areas.

Winter and Fried (2000) conducted focus group interviews with homeowners in northern Michigan to assess the value of reducing the risk of damage from wildland fires in the urban interface. Residents had experienced an impacting wildland fire that was the result of an escaped prescribed fire ignited by the U.S. Forest Service. Although most residents believed wildfire protection to be a shared responsibility between homeowners and the government, residents showed preference for education and enforcement of burning regulations versus modifying vegetation around their homes. Winter and Fried (2000) attributed this perspective to the destruction from the escaped prescribed fire. Even homes with substantial buffers were destroyed in the fire, leading residents to doubt the efficacy of mitigation efforts.

More contemporary research has also examined specifics of wildfire risk and risk mitigation work. Weisshaupt, Jakes, Carroll, and Blatner (2007) and Paveglio et al. (2009) examined landowners and homeowners perception of fire risk and mitigation responsibilities in the wildland urban interface. The participants in both focus groups believed the government had responsibility for managing forests under their control but did not “owe” safety to property owners in the WUI. These residents believed private property owners were responsible for their own protection and supported the mitigation efforts, such as, the creation of defensible space around homes and structures. A contrast between the two studies was the enforcement of risk mitigation measures. Paveglio et al. (2009) indicated that property owners did not support any mandatory enforcement or regulation. Weisshaupt et al. (2007) found that some property owners

supported a tax to assist local governments who were tasked with providing fire protection. Other property owners suggested higher insurance premiums should be applied to urban interface residents.

Brenkert-Smith, Champ, and Flores (2006) conducted in-depth interviews with residents of five different urban interface communities in Colorado. This work provided insights into the actual context of risk reduction decisions. For residences, the implementation of risk reduction activities was a complex decision. The decision involved several factors including the participant's own perceptions of different mitigation options; their social interaction with family, friends, and neighbors; and their community's attitude toward specific risk reduction risk activities.

Outlook

Previous research has documented property owner perception of wildland fire risk in the wildland urban interface (Gardner, et al. 1987; Winter and Fried 2000; Daniel 2007). Professional studies by land management agencies and academia have also assessed land and homeowner judgments regarding the necessary educational, financial, and operational resources necessary to undertake the hazard fuel reduction measures on private property (Jakes et al., 2007).

Within the past decade community wildfire protection planning has become a priority of government, businesses, non-profit organizations, and residents existing in wildland urban interface geographic communities. Notably absent from research has been an assessment of private property owner implementation of hazard mitigation practices in light of community wildland fire planning where funding plus educational and operational resources are available to assist land owners.

CHAPTER III BACKGROUND

This chapter will open with information concerning land ownership, demographics, and local governing bodies in Seeley Lake, Montana. The following section will outline the fire planning for the area, including the development of the 2004 Seeley-Swan Fire Plan, the Community Fire Protection Plan (CWPP) for the communities of Seeley Lake and Condon, Montana. Information on the Seeley Swan Fire Plan was obtained from the plan itself and from interviews with key individuals involved in the formation of this document. The discussion will look at the Seeley Lake Hazard Fuel Taskforce and its role in the implementation of fuel mitigation on private property. In closing the Western Wildland Urban Interface Grants will be explored at both a national and local level.

SEELEY LAKE, MONTANA

Located in the Clearwater Valley of Montana, the town of Seeley Lake is situated between the Mission Mountain Range to the west and the Swan Mountain Ranger to east. Features to the area, including many of the enclosed lakes, are the result of glacial activity (Alt & Hyndman, 1986). Within the Seeley Lake area, public lands account for 55% of the landownership with U.S. Forest Service administering 45% and the State of Montana 10%. Private commercial lands, primarily owned by Plum Creek Lumber Company accounts for 35% of the landownership with the remaining 10% being private residential and undeveloped properties (Seeley Lake Chamber of Commerce, 2012).

The legal structure of Seeley Lake, Montana is an unincorporated community that is governed by the Board of County Commissioners for Missoula County. All legislative, executive, and administrative powers and duties of the local government not specifically

reserved by law or ordinance to other elected officials reside with the Commission (MCA-7-3-401). The Board of County Commissioners has jurisdiction and power to represent the County and has care of the County property and the management of the business and concerns of the County. However, the Seeley Lake Community Council, while not legally recognized as governing body, was established, in part, to advance and promote the interests and welfare of residents of Seeley Lake (Seeley Lake Community Council, 2012).

The profile of general population and housing characteristic from the 2010 Census data had the total population of Seeley Lake at 1,695 persons. The median age was 49.6 years with 81% of the population 18 years and over and 19.8% of the population 65 years or over. There were 751 households with 496 family households in which 183 had children under the age of 18 years. As of 2010 there were 1,262 housing units with 751 occupied units and 445 housing unit for seasonal, recreational, or occasional use in Seeley Lake. Of the occupied housing units, 604 were owner-occupied with a total 1,334 people residing in these units. The average household size of owner-occupied unit was 2.21 persons (U.S. Census Bureau, 2010).

Although the settlement of Seeley Lake was founded upon timber extraction and timber related industry, the present economic vitality is connected to the scenic beauty and recreational opportunities of the area (Johnson & Nicholson, 1996). The Seeley Lake Chamber of Commerce website advertises the community as a year-round resort destination from which to enjoy the “spectacular unspoiled nature.” Johnson and Nicholson (1996) note the land values and sales plus commercial and residential

development increased precipitously beginning in early 1990's. The real estate and building activity has been attributed, in part, to the purchases and preferences of retirees.

THE SEELEY-SWAN FIRE PLAN

Federal initiatives

In response to several wildfire incidents, which occurred during summers of 2000-2003, a community wildfire protection plan (CWPP) was formed for the purpose of identifying and mitigating significant wildfire risks to the communities of Seeley Lake and Condon, Montana. The Seeley-Swan Fire Plan is the CWPP for the Seeley Lake Rural Fire District and Swan Valley Fire Service Area. Between March of 2003 and March 2004, the Seeley Lake Rural Fire District worked in conjunction with the Montana Department of Natural Resources and Conservation, the U.S. Forest Service, and the Swan Valley Volunteer Fire Department to prepare the 2004 Seeley-Swan Fire Plan. Two public meetings, one in Seeley Lake and one in Condon, were held to gather public input for the plan. In 2008 the fire plan was updated to include the entire Clearwater River watershed and expanded further north in the Swan River watershed. New information included maps and statistics on completed fuel mitigation work and on areas that had been affected by wildfire between 2004 and 2008.

Although community wildfire protection plans (CWPP) are often written to cover a countywide area, many communities, including Seeley Lake, have chosen to develop a more detailed and comprehensive plan specific to their locale. With a CWPP in place, communities are able to apply and receive federal grant money to assist in planning and implementation of hazard mitigation in the wildland urban interface (WUI). Several federal laws are coupled to Community Wildfire Protection Plans (CWPP), including the

federal Disaster Mitigation Act of 2000 (Public Law 106-390) and the 2001 Interior and Related Agencies Appropriations Act (Public Law 106-291).

The 2000 Disaster Mitigation Act requires all local governments to have an approved Pre-Disaster Mitigation Plan in place to be eligible to receive Hazard Mitigation Grant Program project funding (FEMA, 2000). The Missoula County completed its Pre-Disaster Mitigation Plan (PDMP) in October 2004. The Missoula County CWPP is an appendix to the Missoula County PDMP. The Seeley-Swan Fire Plan is incorporated as part of the overall Missoula County CWPP but also serves as the CWPP for the Seeley Lake and Condon areas of Missoula County.

The National Fire Plan (NFP) was developed in August of 2000, following a landmark nation-wide wildfire season. The 2001 Interior and Related Agencies Appropriations Act (Public Law 106-291) provided funding the development of the NFP. The purpose of the NFP was to foster communication and cooperation among federal and state land management agencies, local governments, tribes, and the public. The NFP contains a host of programs that assist in the development of enhanced fire planning, prevention, and mitigation efforts (Steelman, 2007). As part of the National Fire Plan, two programs, the Community and Private Land Fire Assistance and the State Fire Assistance provide federal financial resources to address hazard-fuel conditions on non-federal lands. Through the State Fire Assistance Program the Seeley Lake Rural Fire District applied and received a grant to fund the development of the 2004 Seeley-Swan Fire Plan (Seeley-Swan Fire Plan, 2008).

Seeley-Swan Fire Plan: Contextual information

The project area for the Seeley-Swan Fire Plan is the Forest Fire Districts in the Clearwater and Swan Valleys. Forest Fire Districts are areas established and authorized under Montana state law 76-13-204 MCA: Creation, annexation of land into, and dissolution of wildland fire protection districts. The Montana Department of Natural Resources and Conservation (DNRC) administers the Forest Fire Districts. The boundaries are established through a vote of landowners within the District (Montana Code Annotated, 2011). The four Forest Fire Districts relevant to the Seeley-Swan are DNRC Northwest Land Office and the Flathead National Forest in the Swan Valley plus the DNRC Southwest Land Office and the Lolo National Forest in the Clearwater Valley. The DNRC is the primary agency responsible for wildfire protection to state and to private lands in the Seeley-Swan Fire Plan area. The Lolo and Flathead National Forests are the primary agencies responsible for wildfire protection on federal land. The Seeley Lake Rural Fire Department and the Swan Valley Volunteer Fire Department have lead responsibilities for structural fire and emergency service within their jurisdictional zones (Seeley-Swan Fire Plan, 2008).

Contained within the Seeley-Swan Fire Plan is the identification of assets at risk from wildland fire. The plan also addresses several factors, which are directly related to the risk conditions within the planning area. The assets at risk were identified as: permanent and seasonal residences, businesses, and other infrastructure plus the commercial timber and tourism enterprises. Natural resources at risk from severe wildfires were watersheds, water and air quality, cultural resources, and low elevation forest ecosystems.

The factors that contributed to the current risk conditions include the land use and development trends of the area. The real estate and housing market from the mid-1990's to mid-2000's resulted in increase structure density from the residential development. The residential development was particularly robust within several homeowner associations located in Seeley Lake. Other factors included the past fire suppression programs of state and federal land management agencies. The implication of fire suppression are noted in the Seeley-Swan Fire Plan:

Fire was the primary disturbance agent in this landscape directly influencing large-scale changes in forest species composition, structure, and spatial distribution... Fire suppression programs have had profound effects on many ecological communities and ecosystem processes. Fuel loadings in the Clearwater and Swan Valleys have been altered considerably over the past 100 years... As a result of fire suppression, many areas that have not received vegetation treatments [timber harvesting] have experienced accumulations of fuels (p. 16).

Summer fire weather and the different types of fire regimes are part of the expected dynamics to the surrounding forests of the Clearwater and Swan Valley. The summer weather patterns, which contribute to critical fire weather, include high afternoon temperature (80-90°F), low relative humidity, and winds greater than 10mph. From July through September the area often experiences drought conditions due to extended periods of high temperatures. These drought conditions when coupled with thunderstorms and the associated lightning, high winds, and little rain have resulted in numerous wildfires (Seeley-Swan Fire Plan, 2008).

For the Seeley-Swan Fire Plan area, three primary historical fire-regimes influenced forest conditions prior to the implementation of fire suppression activities. The work of Agee (1993) explained the different fire-regimes and the work of Arno (1980) explored the influence of fire on forest types in the Northern Rockies. The short-

interval fire regime is predominantly characterized by relatively frequent, non-lethal, and low to moderated intensity fires that burn along the ground and remain within the understory of the forest canopy. The frequency of these fires, generally between 5-25 year intervals, influences both the species composition and vegetation structure of these forests. Fire tolerant species such as ponderosa pine and western larch become dominant in the overstory and bunch grasses in the understory. An infrequent, lethal, high intensity fire that consumes both the understory and overstory characterizes the long-interval fire regime.

Stand replacing fire regimes result in a short term, catastrophic effect of stand conditions. Mixed severity fire regime is dependent on site conditions or position on the landscape. Either non-lethal or lethal fire could occur within a mosaic of diverse stand conditions. The mixed severity fire regimes are common throughout the transitional portions of the environmental gradient where the lower elevation, drier sites are dominated by non-lethal fires and the high elevation sites, moister site are dominated by lethal fires. Topographic features can also influence the occurrence of a mixed severity fire regime. Dry south aspect slopes and ridges can be predominantly influenced by a short-interval fire regime.

Seeley-Swan Fire Plan: Specifics of fire planning

The Seeley-Swan Fire Plan (2008) outlines five strategic objectives to address risk mitigation from wildfire.

1. Facilitating community planning which outlines strategies for protecting community values.

2. Identifying existing information and conducting wildland-urban interface risk assessments for the project area.
3. Identifying pre-fire management risk reduction actions and programs.
4. Developing a community fire plan that can be integrated with local comprehensive growth and development plans to ensure social, economic, ecological concerns.
5. Developing a framework to ensure wildfire policy, prevention, and funding efforts are coordinated locally among stakeholders that include local communities, as well as private and public organizations.

A risk assessment was conducted to evaluate the risks posed by wildland fire to the communities of Seeley Lake and Condon, Montana. The purpose of the assessment was to determine the areas were most vulnerable to future wildland fires. A map of forest cover types for the Fire Plan area was developed from satellite imagery. The fuel types and slope percentages of the surrounding landscape were each given a numerical rating. By combining the slope and fuel numerical ratings, locations through the planning area were then given a fuel hazard rating. Next, information on structure densities per square mile for fire plan area was combined with primary evacuation routes to produce another numerical weighting. The fuel hazard rating and structure densities/evacuation route information were then combined to produce a final score. 80% of final score came from the fuel hazard rating and 20% from the structure densities/evacuation route. From the final score, the risk assessment identified four priority levels: very low, low, moderate, and high priority areas. Maps for the Clearwater and Swan Valley were produced to

illustrate the locations of four priority levels. The areas with high rating were then listed by ownership and prioritized for prevention actions, by either land management agencies or funding support to implement fuel mitigation thinning on private land.

The Seeley-Swan Fire Plan contains other wildland fire risk mitigation planning which include evacuation procedures, emergency communication, and fire and building codes. With relevancy to the research question, noted will be portions of the Fire Plan that provide specifics on funding and support of fuel mitigation on private lands. In the Clearwater Valley – the South Fire Plan Area – a total of 19,874 acres of high priority and 40,458 acres of moderate priority level lands were identified from the risks assessment. For non-commercial, private land a total of 4,866 acres of high priority level and 7,098 acres of moderate priority land were identified within the urban interface. Although no specific targets are provided for mitigation work on private property, the overall mitigation goal is to reduce the number of acres in the high priority category by at least 10% of the initial assessed total the each year.

The Seeley Lake Fuels Mitigation Task Force, a cooperative group that includes representatives of the Clearwater Resource Council, Seeley Lake Rural Fire Department, U.S. Forest Service, Montana DNRC, Swan Ecosystem Center, and the Bitterroot Resource Conservation and Development (RC&D) was formed to coordinate hazard fuel mitigation efforts outlined in the 2004 Seeley-Swan Fire Plan. The group meets monthly at the Seeley Lake Rural Fire Department to inform and to evaluate the progress of hazard fuel mitigation projects on state, federal, and private lands.

Updated in 2008 by the members of the Seeley Hazard Fuels Mitigation Task Force, Seeley-Swan Fire Plan noted that the Task Force had received over \$300,000 in

grant money and completed fuel mitigation on over 450 acres of private land. In the Swan Valley, Montana DNRC works with the Swan Ecosystem Center, a non-profit organization, to assist private landowners in completing fuel mitigation work. In the Clearwater Valley, which includes Seeley Lake, the Montana DNRC cooperates with the Bitter Root RC&D for fuel mitigation projects on private property. In the urban interface of Mineral, Missoula, and Ravalli Counties, the Bitter Root RC&D has been given responsibility to administer the Western Wildland Urban Interface Grant Program for the Montana DNRC. The administrative duties are divided between one full-time and two part-time foresters. There is one part-time forester who coordinates grant-funded projects for Seeley Lake.

The Western Wildland Urban Interface Grant

Although there have been other state and federally funded grant programs to complete hazard fuel mitigation on private lands in Seeley Lake, the Western Wildland Urban Interface Grant ¹ been the most financially substantial in terms of dollar amounts and consistent annual appropriations (Bitter Root RC&D, 2011).

Through the 2000 National Fire Plan (NFP), the State Fire Assistance Program was established and serves the funding pathway for Western Wildland Urban Interface Grant. Congress annually appropriates funding for the National Fire Plan. The federal funds are made available through the USDA State and Private Forestry Division to individual states through the State Fire Assistance Program. In Montana, the DNRC

¹ The Western Wildland Urban Interface Grant is commonly referenced as the Western States Grant. I use shorter version of the grant -Western States Gant - throughout this paper.

Forestry Division receives funding via USDA State and Private Forestry Division (DNRC Forestry Division, 2012).

The application and awarding of a Western Wildland Urban Interface Grant involves an annual, two-step process. The grant awards are limited to the 17 western states and six Pacific Island territories of that comprise the Council of Western State Foresters. Any non-profit organization with a specific hazard fuel mitigation project, such as a rural fire department or homeowner organizations, can apply for the grant. The Bitter Root RC&D serves as the grant applicant for Seeley Lake. As a federally funded program, the applicant must be capable of fiscal distribution, accounting and reporting of the grant monies.

Various organizations submit their applications to the state agency overseeing the State Fire Assistance Program. In Montana this is the DNRC Forestry Division of Fire and Aviation Management Bureau (FAMB). The state then scores and ranks the applications based on criteria, such as, the project ties to a CWPP and past grant funding for the project area (DNRC Forestry Division, 2012). Depending on forecasted Congressional funding for the National Fire Plan, the state forwards approximately 5-10 of the highest-ranking projects to a national group - the Western Wildland Fire Protection Committee. The Committee consists of fire management professional representing the 22 states and territories of the Council of Western State Foresters.

The Western Wildland Fire Protection Committee then independently scores each application. Every application is assigned a numerical rating with 13-points being the highest attainable score. Points are awarded based upon criteria, such as, the project

being linked to a CWPP, completion of a thorough line-item budget, and planning documentation outlining maintenance procedures for the project (Weber-Sword, 2011).

The next step in the procedure is the funding process, which takes place in rounds. Assigned a numerical score of 2-13 points, the top ranked project from each state is assessed against all other top ranked projects. For example the top ranked project for Montana may be Seeley Lake, which received a numerical score of 11. The top ranked project from Idaho may be in Boise and the project received a numerical score of 13. Therefore, in the first round only the Boise project would receive grant funding. All “rounds” of state ranking will continue until all 13-point projects have received funding. The process is then repeated by examining all 12-point projects. In this example Seeley Lake, the top project from Montana, would be only considered for funding only after all 13-point and 12-point were awarded. The Western Wildland Fire Protection Committee continues through round of allocation until all available funding is awarded to projects. Each grant request is limited to a maximum of \$300,000 (Weber-Sword, 2011).

The Western Wildland Urban Interface Grant & Seeley Lake

Starting in 2000, Seeley Lake has been awarded several Western Wildland Urban Interface Grants including funding for the 2012 fiscal year. For property owners in Seeley Lake the Western Wildland Urban Interface Grant allows for a 50%-50% cost share, meaning a property owner would be responsible for half of the final expenses to project. Any merchantable timber taken from a project can be subtracted from the overall cost and then grant money is applied to offset half of the remaining expenses.

Seeley Lake residents interested in completing hazard fuel mitigation work on their property are required to complete an application form- the *Bitter Root RC&D*

Hazardous Fuel Program: Western States Wildland Urban Interface Grant-Cost Share Application. The application entails providing information on the property location and a site description of the project area. Applicants are requested to provide particulars on the soil types, the range of percentage slope, the prominent vegetation types, the road accessibility of the property, the presence of proximate live streams, and as best possible the land use history of the area.

Applicants are asked to designate whether the work will be for fuel mitigation on undeveloped property or in concert with creating defensible space around structures. In addition, the form briefly outlines the specifications of hazard fuel mitigation: thinning to an average of 10 feet between crowns of trees, pruning up to 12 feet or 1/3rd the height of a tree and treating all residual slash. A property owner is required to indicate their willingness to meet these specifications.

The forester for the Bitter Root RC&D assess the application and completes a grant rating form which is usually done in concert with a field assessment of the property. The overall project is evaluated and points awarded in eight separate categories, including: values at risk - both infrastructure and natural resources; structure density surrounding the property; accessibility for fire suppression resources; and subjective professional input. The subjective professional input includes a judgment on whether the property owner has the capacity to influence neighbors in undertaking fuel mitigation work. The awarding of subjective professional input points must be documented in an essay within the rating form.

With an assigned rating score, the project is then placed among all other new *and* existing fuel mitigation applications. The limited funding from the Western Wildland

Urban Interface Grant, necessitates a prioritization of projects, even among the lands designated under the high priority area of the Seeley-Swan Fire Plan.

CHAPTER IV METHODS

This chapter is a description of the interpretive approach and grounded theory methodology used in this research project. Next is a discussion of the selection of Seeley Lake, Montana as the research location and the purposive sampling methods used in attaining the participants to this study. The interview procedures and the challenges in data collection are also presented. Finally, there is an explanation of the data analysis applied to generate the findings expressed in Chapter 5.

INTERPRETIVE APPROACH

The central research question is private property owner regard for hazard fuel mitigation in the wildland urban interface forest proximate community of Seeley Lake, Montana. Since the focus of this work is to document and analyze private property owner reasons and justifications for implementing hazard fuel mitigation, the study required research methods, which were capable of illuminating this specific information. For this reason, I selected a qualitative research approach that is interpretive, as I am interested in how people understand the social action of undertaking fire prevention efforts in a community that has been designated as the wildland urban interface (WUI). According to Berg (2004), an interpretive approach to research:

Allows researchers to treat social action and human activity as text. In other words, human action can be seen as a collection of symbols expressing layers of meaning. Interviews and observational data, then, can be transcribed into written text for analysis. How one interprets such a text depends in part on the theoretical orientations taken by the researcher... Researchers with a more general interpretative orientation are likely to organize or reduce data in order to uncover patterns of human activity, action, and meaning (p. 266).

The methodology I use in my interpretive approach to “uncover patterns of human activity, action, and meaning” is grounded theory. Glaser and Strauss (2008) developed

grounded theory for the purpose of building theory from data. However, Corbin and Strauss (2008) note a ground theory approach does not have to culminate in the generation of theory. The analytic tools of a ground theory approach can be used to uncover new concepts and to produce descriptive account from research work, “Researchers need not go all the way to theory development. He or she could stop after concept identification and development and do a very nice descriptive study, adding elements of context and process, as he or she feels competent to do” (p. 162).

The end state to my research is a descriptive account of private property owner’s regard of hazard fuel mitigation in the WUI community of Seeley Lake, Montana. The analytic tools of grounded theory were used to uncover core concepts contained within data. The transcribed interviews with private property owners served as my data for this research. Direct quotes from participants are used to highlight key findings.

As outlined by Corbin and Strauss (2008), the following the grounded theory procedures were employed in my research work. These procedures include the use of purposive sampling; a comparative method of analysis; the use of concepts and their development; and the attempt at theoretical saturation. My observance of these four procedures of grounded theory will be expanded upon in the following sections.

SELECTION OF SEELEY LAKE FOR RESEARCH LOCATION

Designation as WUI

The sampling procedure used in the research location and the selection of participants was purposive sampling. Purposive sampling, also referenced as judgment sample, is based upon the research question as well as considerations of the resources available to the researcher (Hesse-Biber & Leavy, 2006). The selection of Seeley Lake

as a research location was based upon two criteria: one, the location had to be designated as wildland urban interface area and two, the resources available to conduct a thorough yet financially reasonable research project as a graduate student. The WUI designation for the forest proximate community of Seeley Lake was officially recorded under Title IV of the FY 2001 Appropriations Act of the Department of the Interior and Related Agencies (Public Law 106-291). The designation and compilation of wildland urban interface communities was completed in response to the 2000 fire season where nationally more than 6.8 million acres of public and private lands were impacted by wildfire. The Department of Agriculture and Department of the Interior worked with state, tribes, and local governments to target hazard fuel reduction work on federal lands within proximity to WUI communities. An initial step in planning hazard fuel reduction work was assessing the location necessary projects. Among the ninety-one locations in Montana, Seeley Lake was designated as a WUI community (USDA & USDI, 2001).

Seeley Lake had other aspects that made this locale a good location for a research site. Property owners in the area had familiarity with wildland urban interface fires and fire prevention outreach as a result of these incidents. Over the past decade the area had experienced several significant wildland fire events. In response to these incidents, the local rural fire departments, federal and state land management agencies plus non-profit and for-profit organizations assisted in the development of the 2004 Seeley-Swan Fire Plan (Seeley-Swan Fire Plan, 2008). Outlined in this plan were procedures to support private landowners in the implementation of fire prevention efforts, specifically hazard fuel mitigation. The ability to receive financial and educational assistance was advertised

in the local newspapers, homeowner organization newsletters and website, and through several community fire prevention meetings.

Practical considerations

As a graduate student at the University of Montana, the proximity of Seeley Lake to Missoula was a practical choice both financially and logistically. Between October of 2009 and January of 2010 I was able to complete the majority of my interviews with private property owners. From members of the Seeley Lake Hazard Fuels Taskforce, I obtained background information on community-wide hazard fuel mitigation. These individuals were local, state, and federal professionals involved with the implementation of the 2004 Seeley-Swan Fire Plan, the community wildfire protection plan (CWPP) for the Clearwater River and Swan River watersheds (Seeley-Swan Fire Plan, 2008). I was also able attend three meetings on the Hazard Fuels Taskforce. To gain perspective at a more neighborhood level, I attended three meetings of a homeowner association (HOA) fire prevention committee. This volunteer group interfaced with members of the Seeley Lake Hazard Fuels Taskforce and performed outreach work to fellow HOA members regarding fire prevention efforts, including educational and financial assistance for hazard fuel mitigation.

SELECTION OF RESEARCH PARTICIPANTS

Overview

The sampling procedure used in the selection of participants was purposive sampling. Purposive sampling targets particular a groups of people when the desired population for a study is rare or difficult to locate or recruit (Hesse-Biber & Leavy, 2006). In developing the proposal to this project, my review of social science literature

on the WUI and fire prevention cited the absence of perspectives from property owners who did not engaged in prevention activities (Brenkert-Smith et al., 2006). Also underrepresented were certain types of property owners. Missing were perspectives from part time residents or owners of undeveloped lands (Bright and Burtz, 2006). This included perspective from both groups those who had or had not engaged in fire prevention activities.

I conducted interviews with two groups of property owners - those who had implemented hazard fuel mitigation and those who had not implemented hazard fuel mitigation. I also intentionally sought interviews with the three types of non-commercial private property owners in Seeley Lake: permanent residents, part-time or “seasonal” residents, and the owners of undeveloped land.

In addition to a literature review, preliminary work for this project - coursework for EVST 555: Research Methods for Social Change - influenced the research design and participant selection. The project semester-long project focused on the experience of wildland fire in Seeley Lake, Montana. In gathering contextual information, the professionals working on fire prevention for land management agencies and non-profit organizations noted the challenges involved in hazard fuel mitigation outreach to the three different types of property owners. Based upon this knowledge, I sought to capture the viewpoints and behaviors of Seeley Lake property owners who were permanent and seasonal residents plus the owners of undeveloped land.

For consistency in sampling the participants had to hold title to their property. I did not interview individuals who were leaseholders or renters. I made the supposition that because renters and leaseholders did not “own” the property their regard for

preventative measures, such as, hazard fuel mitigation would not be viewed as their responsibility. In addition, I was looking for a consistent base or starting point from which to look for patterns and variations between interviews. Keeping property ownership as a criterion allowed for a comprehensive comparison three types of property ownership and their regard for hazard fuel mitigation.

There are a few points of clarification on the three types of property owners targeted in this research. The definition of part-time residents and undeveloped landowners was holding primary residency in location *outside* of Seeley Lake, Montana. In this study, the undeveloped landowners had no structures on their property. By coincidence I did not interview any permanent resident that were also the owners of undeveloped land in another location in Seeley Lake, Montana. All permanent residents held title to only one parcel of land where their primary residence was situated at the time of my research.

During the fall of 2009 and the winter of 2010, I conducted a total of 42 interviews: 26-in person interviews and 16-phone interviews. The phone interviews were a necessity as some property owners were out of state and as such in-person interview was not a feasible option. The table below illustrates the two groups of property owners with the number of interviews conducted in three types of property ownership.

Table 4.1 Number of interviews by group and type of property ownership:

Interviews with Property Owners Who Implemented Hazard Fuel Mitigation	Interview with Property Owners Who Had Not Implemented Hazard Fuel Mitigation
Permanent Residents 15	Permanent Residents 6
Part-Time Residents 8	Part-Time Residents 3
Undeveloped Landowners – no structures 7	Undeveloped Landowners – no structures 3
30 total Implemented HFM	12 total Did not implemented HFM
42 total interviews	

From the total 42 interviews: there were 33 interviews with only one individual and there were nine interviews where both partners/couple in property ownership were present. In total 51 persons (32 + 18) were interviewed. I did not seek to have a particular number of “individual” or “partnered” interviews. The majority of in-person interviews were conducted at the property owner’s residence and the chance the interview would include both partners in property ownership was purely random.

Specifics

The purposive sampling of property owners was accomplished in two parts. Part one was initiated through my coursework for EVST 555: Research Methods for Social Change.² This class project had provided for interaction with Seeley Lake residents, a few of whom were involved with prevention outreach within their particular homeowner association. After developing my research proposal, I contacted these individuals and

² The interviews from EVST 555 are not part of this research project. The objective of this previous research and the interview guide were different. I did not want to introduce any inconsistency to this research.

requested their suggestions on other property owners who would be willing to give an interview. My reasoning for using their assistance centered upon gaining access to underrepresented groups.

The previously interviewed property owners from EVST 555 were very accommodating in providing contact information on property owners who had not implemented fuel mitigation. For eight participants who had *not* implemented fuel mitigation, contact by their associate was done in advance of my request for an interview. I believed this was a respectful gesture as hazard fuel mitigation is often portrayed as an essential activity and therefore “right thing to do” as a responsible WUI property owner. I believed requesting the time for an interview and the sharing of personal information in a “cold-call” from a completely unknown source would have yielded less participants. The initial outreach from a familiar and credible source allowed these property owners to verify the credibility of this study.

With regard to the remaining four property owners who had not implemented fuel mitigation work, I made the initial contact and set-up the interview with two individuals. These property owners were amenable and open to being interviewed for this project. For the remaining two property owners, the recommending individual requested anonymity. These two property owners were on a list as potential recipients for a Western States Grant. I made phone contact and cited their application to the grant assistance program as a means for requesting an interview. I will address the use of Western States Grant applicant information below.

I also conducted interviews with four permanent residents who had implemented fuel mitigation on their lands. These property owners also participated with fire

prevention outreach in their local neighborhood or homeowner association. My contacts from EVST 555 believed these four individuals had interesting and insightful perspectives from their experiences with fire prevention outreach.

In total I conducted 16 interviews: four with property owners who implemented fuel mitigation and all 12 interviews with property owners who had not implemented fuel mitigation. 12 interviews were in-person interviews and four were completed in a phone-call interview.

The second part of my purposive sampling used information provided by the Bitterroot Resource Conservation and Development (RC&D) Area, Inc. I was able to gather interviews from property owners who had implemented fuel mitigation as full time residents, part-time residents, and the owners of undeveloped land. For clarity, the part-time property owners were also referenced as “seasonal” residents. Most individuals owned a cabin or cottage-type structure that was occupied primarily during the summer months. Again, the criterion for selecting these individuals was permanent residency outside of Seeley Lake, Montana.

Through the Bitter Root RC&D I obtained a copy of applicants for the Western States Wildland/Urban Interface Grant for years of 2006-2008. The forester, who generously provided the applicant information, cited that this sharing was an ethical gesture. As a federally funded program the information on Western States Grant recipients can be obtained through a Freedom of Information Act (FOIA) request.

An outreach letter using the University of Montana letterhead was sent to 59 property owners. The letter cited their participation in the Western States Grant program, outlined the purpose of my research work, and stated a follow-up phone call would solicit

their participation in an interview. In the letter, I also provided my contact information and contact information for the College of Forestry and Conservation at the University of Montana. One letter was returned to the College of Forestry and Conservation. Out of the 59 outreach letters and follow up phone calls, 26 property owners were interviewed: 11 permanent residents, eight part-time residents, and seven owners of undeveloped property. From these 26 interviewed property owners there were 17 in-person interviews and nine were phone interviews.

INTERVIEW PROCEDURES

Interview Guide

I developed two interview guides for property owners who had implemented and had not implement hazard fuel mitigation. My faculty advisor assessed the two guides before I commenced fieldwork. The two guides maintained a similar format. The first set of questions was intended to help ease into the interview process and included questions on the length of tenure as a property owner and what aspects of Seeley Lake drew them to become property owners.

The next set of questions examined personal experience with wildland fire as a property owner in Seeley Lake or as a resident of any other location. If the property owner had previous experience with wildland fire, they were asked to expand upon this occurrence. Closing out this set of question, the participants were asked to recollect any planning or prevention measure the experience might have initiated for possible future events. This could have included fuel mitigation or perhaps having a checklist of items to pack in case of future evacuation. The focus here was not necessarily fuel mitigation work but how the experience of wildland fire might influence decision-making.

The third set of questions examined preparation for future wildland fire events. Property owners were asked about their knowledge of fire prevention and hazard fuel mitigation. They were requested to cite any sources of information on fire prevention, specifically hazard fuel mitigation and defensible space. Property owners who had chosen to implement fuel mitigation were requested to describe the work, which had been completed and to cite any and all reasons for undertaking a project. Property owners who had not undertaken fuel mitigation were requested to expand upon their reasons and justifications and to cite any concerns with the process or end-state of fuel mitigation work.

The property owners that had implemented fuel mitigation work were asked to provide information on this process, plus information on any unexpected benefits or negative outcomes to the work. These additional questions accounted for the differentiation in the two interview-guides.

The fourth and final set of questions explored community wildfire protection. This set of questions was important because of amount of work initiated to address fire protection in the Seeley Lake area - e.g. the development of 2004 Seeley-Swan Fire Plan, the formation of the Seeley Lake Hazard Fuels Taskforce, and the administration of Western States Grant money through the Bitterroot RC&D.

Both groups of property owners - those who had and had not implemented fuel mitigation - were asked about fire prevention work at the community level. I described the “community” as the landowners to the area - that is, the groups that owned or managed land in the proximity of Seeley Lake. The private lands being those owned by individual or corporations, such as, the commercial timberlands. The public lands being

those under management by the federal and state government. In Seeley Lake public land was primarily state lands under the management of Department of Natural Resources and Conservation (DNRC) and federal lands under the U.S. Forest Service. Participants were invited to provide their views on the rationale and purpose of fuel mitigation completed by both private property owners and land management agencies. In closing, participants were offered to mention any concerns or considerations about community-wide fire protection or to expand upon any topic we had previously covered in the interview.

Interviews

My research proposal was reviewed and approved by the University of Montana Institutional Review Board (UM-IRB). All participants were requested to sign an *Informed Consent Form: Subject Information and Informed Consent* before the interview commenced. Participants were assured of their confidentiality and were encouraged to ask for clarity to any of my question. All in-person and phone interviews were arranged at the convenience of the participant. At the beginning of the interview process, I went over the interview guide and generally described four sections before asking specific questions.

In-person interviews typically lasted 45minutes to one-hour in length. The length of phone interviews varied depending upon the participant's preference. Some property owners chose to set another date for a phone interview. This typically allowed for more interaction and the sharing of information between the participant and me. Others had preference to continue with the interview at the initial outreach phone call. These interviews tend to be the shortest in length, usually around 10-15 minute and I was often

was unable to complete the fourth section to the interview guide. With the property owner who begged off from continuing the interview, there wasn't any pattern to the group or type of property owner but rather just a random occurrence.

All in-person interviews were digitally recorded. Note taking was done throughout the interview, usually for the purpose of asking a participant to further illuminate on a specific topic. Some participants used a unique term or repeated a phrase, which had been invoked by others but could hold different meaning between participants. I transcribed all 26 in-person interviews into electronic documents that became my data for analysis.

With phone interview, I used the interview guide for taking notes. As possible, immediately following the phone call, I transferred my notes and thoughts into an electron "clean" copy of the interview guide. This transfer of information allowed me to recall and capture nuances from the interviews and apply uniformity in recording data.

Challenges to my choice data collection

The use of semi-structured in-depth interviews provided ample material for a grounded theory approach of examining property owner regard for hazard fuel mitigation. There was a difference between the robustness and depth of in-person versus phone interviews. The logistics of capturing the views from certain property owners - the out-of-state seasonal residents and owners of only undeveloped land - coupled with a limited budget left no other alternative. In addition, as I previously stated, some participants preferred to conduct the interview at the initial outreach phone call. I personally worried about imposing upon the valuable time of the participants and usually suggested at the very onset of the conversation that my questions would only take "a few minutes of their

time.” I believe as a more seasoned researcher, I would be more forward about the time necessary to complete the entire interview and would push to conduct a more thorough interview at a later time. I appreciated whatever amount of time participants offered out of their busy lives to assist with my work.

A second challenge was trying to capture the property owners who had not implemented hazard fuel mitigation and were owners of undeveloped land. From my interactions with one homeowners association fire prevention group, these “absentee” landowners were a difficult group to contact and to provide information on hazard fuel mitigation. I tried to reach four “absentee” property owners by leaving a voice message but did not receive any response.

The third challenge was keeping up with the incoming data. At the onset of data collection I was able to spend more time reflecting upon the handful of interviews that had been completed and transcribed to an electronic copy. Between November and January of 2009 I found myself busy with arranging and conducting in-person interviews with participants in the Seeley Lake and Missoula area. In the same time period, I was sending my outreach letters to the Western State Grant recipients. The letter did stipulate a phone call would be initiated within a week to ten days. Keeping to schedule on the interviews and outreach was demanding. Outside of the phone interviews, the bulk of in-person interview “sat” until I started transcription work in the spring of 2010. In future efforts I would have kept these two part separate. I would complete the in-person and then move to the outreach letters and phone interviews. This break in data collection would allow more time to examine each interview and write a short-memo to better track patterns and trends in the data.

DATA ANALYSIS

The analytic activity to my research was done through content analysis of transcribed interviews with private property owners. Generally, content analysis is regarded as techniques for making inferences by systematically and objectively identifying special characteristics of messages (Berg, 2004). Objective analysis of messages conveyed in the data being analyzed is accomplished by means of explicit rules called criteria of selection, which must be formally established before the actual analysis of data. This requirement eliminates analysis in which only material supporting the investigator's hypotheses are examined (Berg, 2004). The criteria of selection for my analysis included:

- Topics covered in the interview guide.
- Concepts and categories that emerged from the data.
- Transcriptions of interviews as well as their requisite coding. Coding then lead to the development of concepts that were then “elevated” to a single category – that is concepts had to go independently into one category.

The specifics of data analysis

The digitally recorded interviews were transcribed into text. This activity took a long time for me to complete, as professional transcription costs were prohibitive. I utilized the process of open coding to examine the transcripts. According to Corbin and Strauss (2008), “opening coding is breaking data apart and delineating concepts that stand for blocks of raw data” while concurrently “qualifying those concepts in terms of their properties and dimensions” (p. 195). A few words or a short phrase, that are codes, were assigned to best describe the data contained in the transcribed interviews. During

the process of coding a few sentences on a particular insight were written in the margin on the interview. This activity allowed me to track my thought process in the development of concepts. I was able to compare how I felt about the significance and weigh of certain concepts over the length of my research work.

Development of categories

After initially coding data the interviews, I was overwhelmed with the amount of data. Following the guidance provided by Corbin and Strauss (2008) I decided to write summary memos for every in-person interview and lengthy phone interviews. The memos helped to develop the data in the coded interviews into concepts. The process of memo writing also allowed for “asking questions, making comparisons, throwing out ideas, and brainstorming” (p. 170). According to Corbin and Strauss, “concepts are interpretations, the products of analysis” (p. 159). These concepts should be developed to have properties and dimensions. These properties are the characteristics that define and describe concepts. Dimensions are the variations within properties that give specificity and range to concepts.

These concepts were examined and given status as either lower-level or higher-level concepts. The higher-level concepts “represent relevant phenomena and enable the analyst to reduce and combine data” (Corbin & Strauss, 2008 p. 165). Higher-level concepts group the lower-level concepts according to shared properties. The higher-level concepts are what I referred to as the categories in this project.

According to Berg (2004) categories are developed and revised based upon the efforts of the researcher and his knowledge of the data and research topic:

There are no easy ways to describe specific tactics for developing categories or to suggest how to go about defining (operationalizing) these tactics. Categorizing tactics – some done in advance, some developed later – should be consistent not

only with the question asked and the methodological requirements of science but also with a relation to the properties under investigation. Categories must be grounded in the data from which they emerge. The development of categories in any content analysis must derive from inductive reference concerning patterns that emerge from the data” (p. 276).

For Corbin and Strauss (2008) categories are the concepts that are most prevalent throughout research data. Since this research was not statistically based, the categories also joined diverse and what initially appear to be separate concepts together, “some concepts get elevated to the status of category/theme because they seem to run throughout the entire interview but also because they seem to be able to pull together some of the lesser concepts” (p. 188).

Microsoft Word was utilized to initiate and to track my category development into a table. The table had a separate row for each category. Several short sentences justifying the status of category were written beneath. The lesser concepts with direct quotes from the transcribed interviews were placed beneath each category. All memos on the in-person interviews and every phone interviews were examined at this stage. The full in-person interviews were referenced to support or elucidate my decisions on category development.

Integration

Integration is the process of linking categories by refining and trimming the theoretical construction (Corbin & Strauss, 2008). Developing a short “master” list of categories allowed for the formulation of the findings. The refinement of categories and use of quotes were integral in creating a description about hazard fuel mitigation in the WUI community of Seeley Lake, MT. The use of particular quotes to express and to illustrate a category was often based upon the articulateness of a participant. Their quotes encapsulated the meaning to a category more thoroughly than others.

A tenant of grounded theory is looking for the negative case to theory development. The negative case is “the expectation to the action/interaction/emotional response of others being studied... looking for the negative case provides for a fuller exploration of the dimensions of a concept” (Corbin & Strauss, 2008 p. 84). The research questions were created to purposefully look for opposing perspectives in the implementation of hazard fuel mitigation. I was searching for other equally compelling explanations to my development and integration of my categories. The importance of negative case became most apparent with the writing of the Chapter V: Findings.

A final consideration for a grounded theory approach to interpretive research is theoretical saturation. Corbin and Strauss (2008), note theoretical saturation as the time when “categories are well developed in terms of properties, dimensions, and variations. Further data gathering and analysis add little new to the conceptualization, though variations can always be discovered” (p. 261). Whether I have fully developed the dimension to all of my categories is debatable and I suspect I have not in a few instances. The finances for my project allowed for research to take place over several months – October 2009 to January 2010.

In addition, my commitment to work as a seasonal wildland firefighter with the U.S. Forest Service precluded visiting Seeley Lake during the summer months when more part-time residents are in the area. As a resort community, I think some amount of research in during the summer months would have allowed for opportunity to capture more permanent and part-time residents. I have thought one avenue for recruitment would be the Sunday morning farmer’s market that occurs from June to September in downtown Seeley Lake. Giving away a coupon for a free head of lettuce or latté could

entice shoppers to take a short survey on fire prevention. A more in-depth interview could be solicited from this group of participants. However with regard to this current project, I am pleased that I managed to obtain interviews with at least three individuals from the three types of property owners who implemented, or not, the fire prevention measure of hazard fuel mitigation.

CHAPTER V

FINDINGS

INTRODUCTION

This chapter will examine the reasons and justifications property owners in the wildland urban interface community of Seeley Lake provided regarding the practice of hazard fuel mitigation. The findings include statements from two groups of property owners, individuals who had chosen to implement, or to not implement hazard fuel mitigation on their property. Within the two groups are three types of property owners, those who were permanent residents, seasonal residents, and the owners of undeveloped land. At the outset on this research I had thought patterns might emerge from the viewpoints and behaviors among the three types of property owners. Most likely due to the small number of participants in each group and type of property ownership, few patterns emerged from the data on the type of property ownership and the actions and viewpoints of individuals. The lack of patterns among the type of property ownership is given more consideration in the following text.

Generally, the findings are divided into six sections that investigate the statements of property owners regarding hazard fuel mitigation. The sections are arranged in a linear manner and progressively examine: how property owners gained knowledge and information on fuel mitigation; what was the purpose of hazard fuel mitigation; what were reasons and justifications for property owner action or inaction; and what were results and implications of hazard fuel mitigation.

More specifically, the first section “Awareness of Fuel Mitigation” examines how individuals came to first gain knowledge on hazard fuel mitigation and their experience,

if any, with wildland fire. The next section “Perspectives of Wildland Fire and Fuel Mitigation” inspects the purpose of hazard fuel mitigation as a risk reduction activity. Some property owners believed the work, provided protection to the personal investments while other individuals stated alternative means to cover potential losses from a wildland fire. The next section, “Espoused Values,” examines the personally held values property owners stated in their justifications of undertaking, or not, hazard fuel mitigation work. In the “Actions of Stewardship,” detailed is the use of hazard fuel mitigation as an effort to provides for the restoration of healthy forests. In “Barriers to Hazard Fuel Mitigation,” cited are the difficulties property owners encountered in the process of fuel mitigation. This section also explored the constraints that prevented some individuals from even initiating this prevention effort. In closing, the unexpected benefits and adverse impacts of hazard fuel mitigation are investigated in the “Implications of Hazard Fuel Mitigation.” Before delving into the six main sections, a few paragraphs are provided in order to clarify terminology and phenomenon located throughout Chapter V: Findings.

Hazard fuel mitigation as “incentives” and “barriers”

At the outset of the project I had contemplated that most property owners either implemented, or not, hazard fuel mitigation for reasons surrounding risk reduction from the possibility of a future wildland fire event. I had assumed there were two distinct factions with some variation in the reasons and justifications within each group. There would be property owners who recognized the potential risks of an urban interface fire and proceeded to undertake fire prevention efforts, including fuel mitigation. The property owners who did not undertake fuel mitigation might provide justifications that centered upon accepting the risk as a cost for enjoying the benefits of the surrounding

landscape. In addition, some individuals probably had little experience or education with regard to wildland fire and lacked an understanding of the potential risks and dangers of residing in the wildland urban interface.

Since commencing my research, I found both groups of property owners provided diverse reasons and nuanced justifications for their position on fuel mitigation. Hazard fuel mitigation was often undertaken for incentives outside of just risk reduction from wildland fire. The collection of reasons and justifications for implementing fuel mitigation will be called “incentives.” In contrast statements from property owners who not did undertake fuel mitigation will be regarded as “barriers.” These “incentive” and “barrier” statements offered by both groups will be presented, for the most part, in a sequence. As example, the theme of “personal responsibility” will include statements from property owners who implemented fuel mitigation followed by assertions from individuals who had not accomplished any fuels work. A brief discussion summarizing the findings will follow each major section.

For clarity the property owners regarded as not having implemented fuel mitigation were those individuals that had not removed any vegetation for the purpose of fire prevention. Activities such as the clearing of trees and brush on undeveloped land for a building site were not considered hazard fuel mitigation but rather part of the construction process in building a structure.

Permanent residents, seasonal residents, and undeveloped landowners

In designing the research I attempted to capture the beliefs and behaviors of two groups of private property owners - those who had implemented fuel mitigation and those who had not. In addition, these property owners were also classified into three types of

permanent resident, the part-time or seasonal resident, and the owners of undeveloped lands. These three types of property owners constitute the non-commercial landowners in Seeley Lake, Montana. Given the small sample size and research design, statistical analysis is not possible with the data from this study. However, where possible I attempt to provide a measure of magnitude to the data. Occasionally the words “all,” “the majority,” “few,” or “several,” are used to convey prevalence among the property owners’ viewpoints and behaviors. For clarity “few” would equate to 2-3 individuals; “several” would be 3-5 individuals.

At the end of this chapter is an analysis table, which provides a list of the categories derived from content analysis of the interviews with Seeley Lake property owners. The categories were developed from the reasons and justifications stated by individuals for implementing or not implementing hazard fuel mitigation. The unexpected benefits and adverse outcomes of fuel mitigation experienced by property owners are not listed in this table but are addressed in the concluding sections of this chapter: “Barriers to Hazard Fuel Mitigation” and “Implications of Hazard Fuel Mitigation.”

Examining the analysis table, the number represent each property owner. These numbers were randomly assigned insure anonymity to each property owner and to assist in identifying patterns from the data. Where appropriate the use of a percentage or a ratio will be utilized to provide a description of magnitude to the research data.

Only a few patterns could be discerned from the search data. One pattern involves the property owners who did not implement hazard fuel mitigation. These property owners could be separated into two categories. In one category were property

owners who wanted to engaged in fuel mitigation but stated constraints including the lack of adequate time and the physical ability to undertake this intensive labor prevention effort. These individuals also cited the expense of contracted fuel mitigation as a substantial barrier. Other property owners did not want to engage in fuel mitigation work. These individuals cited a series of disincentives. Some thought altering the forested landscape would result in a loss of privacy and an undesirable change in the appearance to their property.

Overall few patterns emerged from the data regarding their viewpoints and actions among the three types of property owners. Individuals offered similar reasons and justification for their behaviors and viewpoints. For instance, in examining the theme of healthy forest, permanent residents, seasonal residents, and the owners of undeveloped land mentioned implementing fuel mitigation for reasons surrounding the concept of healthy forests. These property owners believed fuel mitigation provided a measure of risk reduction from wildland fire and a healthy environment to the remaining trees. Within the group of property owners who to did not implement hazard fuel mitigation and cited barriers to the process, three individuals mentioned wanting to undertake mitigation for reasons surrounding healthy forests. The concept of healthy forest was not limited to a specific group or type of property owner.

Levels of hazard fuel mitigation treatment

The intensity of fuel mitigation property owners accomplished can be viewed along a spectrum. Some property owners, whose lands were dominated by pine tree species, which had been damaged by the mountain pine beetle, had little option but to remove nearly all of the mature timber. This work was occasionally in excess of any fire

prevention standards advocated by rural fire department or county, state, or federal fire prevention specialists. A property owner noted the severity of the fuel mitigation work that had to be done on her land:

I wanted to get some removal done but I did not want to go to the extent we finally had to do because of the bug kill... I felt we took way more trees than I would have normally take but they were bug killed so we just felt they had to go.

Other property owners who accepted financial assistance through the Western States Grant Program were required to implement hazard fuel mitigation according to specific fire prevention standards. An example of a fuel mitigation standard is a ten-foot spacing between the canopies of any mature timber within 30-feet of a structure. For some property owners, these fuel mitigation requirements tied to grant money assistance were not compatible with their thoughts in the management of their land. A few individuals decided not to engage with the grant program but instead opted to implement fuel mitigation according to their preferences. As noted by one property owner:

I quite aware of the need to clean up brush that is down. I know that it is really important to get that done. I think we had a DNRC forester come out to our property and say – “Well you need to take this, this, and this.” We were unwilling. I’m not going to thin my property out and make it a park. That isn’t why I moved here.

Although a few property owners might not have met some specific fire prevention standards, the work was done to provide measure of risk reduction from a future wildland fire. This incompatibility of property owner preferences and fuel mitigation standards provides insight into a barrier one individual encountered during the process of undertaking hazard fuel mitigation. Examining barriers encountered by property owners, allows for a discussion of where adjustments to the process of hazard fuel mitigation could be made by state, federal, and local agencies involved with community fire protection.

Multiple “reasons” for hazard fuel mitigation

Private property owners executed hazard fuel mitigation for a variety of reasons, including but not exclusively, risk reduction from a wildland urban interface fire. All property owners who had implemented fuel mitigation stated at least two reasons for undertaking the prevention effort. One permanent resident acknowledged her justification was actually several interconnected ideas:

To me reducing fire risk is being a good steward. When you learn about the risks that are there and you're not taking care of your land, you're liable for that. You're liable for not doing what is right for the land and for your neighbors and all of those people. So there is an obligation to be the good steward and the good steward is to make those forests healthy again as best you can. It's an intermingled thought pattern. You can't do one without the other.

The statement contains four reasons - the responsibility for the management of personal property for risk reduction; the implication fuel mitigation has for neighbors and the greater community; a stewardship ethic which requires the active management of private property; and the belief that active management would make the forested landscape in the area “healthy.”

Several property owners stated the risk reduction from a potential wildland fire was not even the primary reason for fuel mitigation but rather part of an overall strategy for managing their land. These property owners often used the phrase “healthy forests” as an incentive for the work. One property owner admitted the contracted fuels work she commenced was “to see if there was anything I needed to do for healthy growth.” After attending a local workshop, which focused on forestry practices for private landowners, she applied for and was awarded a Western States Grant for hazard fuel mitigation work. She acknowledged her goal was to achieve a “healthy forest” with fire prevention as a secondary consideration, “Yeah, it was definitely for a healthy forest rather than fire. I

mean fire was part of it thought.” The exploration of these incentives, such as, a “healthy forest,” along with other reasons and justifications property owners provided will be explored in more detail in the section “The Actions of Stewardship.”

AWARENESS OF HAZARD FUEL MITIGATION

Before implementing hazard fuel mitigation property owners encountered some incentive that served as a motivator for action. In some instances this was a first hand experience of a wildland fire. There were property owners who were not inclined to seek fire prevention after the experience of a WUI fire. Both groups of property owners stated various experiences which influenced their decision-making to implement, or not, hazard fuel mitigation.

Experience of a wildland urban interface fire

For many property owners the experience of a wildland urban interface fire was a distressing event that changed perspectives and prompted the need for risk reducing activities. Many property owners referenced their personal experience with the 2007 Jocko Lakes fire. One couple who were evacuated from their property admitted the experience of a fire so close to their home was highly stressful:

We went through that in the '07 fire. I wouldn't want to go through that again. That was three week of terror. We didn't know one day from the next whether that fire was going to come down from that ridge.

Their implementation of hazard fuel mitigation would hopefully provide protection in the event of future wildland fire and presently allowed for some assurance and peace-of-mind: “Well, we feel safer. We look better and it's a load off our minds... Yeah know, what to do with all that debris around.”

Some individuals were new to the phenomenon of wildland fire due to residing in areas, which lacked any occurrence of wildland fire as a natural hazard event. One property owner acknowledged she was “freaked out” by the Jocko Lakes Fire. She and her family had just moved to Seeley Lake from Pennsylvania to enjoy their retirement. The fire raised awareness and changed perspectives about living in a heavily forested landscape:

Well it was the first year we were here and we’re not used to fire back east. So it was my introduction to fire. I was always as tree hugger – “Don’t cut any trees down. I don’t care what the reason... Don’t cut any.” But I tell you I have a new appreciation for cutting trees down with fire proofing your property.

Other property owners admitted to having knowledge of wildland fire and fire prevention outreach materials but discounted the possibility of an urban interface fire affecting their circumstances. They confessed to only glancing at the fire prevention outreach information in sources, such as, the local newspaper and homeowner organization newsletters:

The Jocko Fire is the one that really perked me up to... When we would get flyers and whatnot... Every summer they run stuff in the paper about cleaning up your property and that kind of stuff. I just skimmed – “This isn’t going to happen.” Well it does happen. The Jocko Fire bumped that up because it was so close. The fire could have jumped the road and we would have been in really deep trouble here.

The experience of a significant wildland fire influenced previously held perspectives. Once property owners believed harm could happen to them, some individuals undertook fuel mitigation for risk reduction.

The experience of wildland fire did not cause all property owners to seek out mitigate work for the purpose of future protection. In examining the range of perspectives, there were a few individuals who spoke of their fear and trepidation surrounding the Jocko Lakes Fire but had not undertaken any fuel mitigation after the

event due to specific barriers that prohibited them from implementing the work. One permanent resident recounted the negative impact that accompanied the events during the summer of 2007: “Yeah, I didn’t sleep. It totally affected my business. I lost business. Everybody evacuated. It was horrible. It was a horrible summer.” When asked about the state of her property and “awareness” of fuel mitigation as a risk reducing effort, she expressed her sentiments:

I’m hugely aware. Terrified aware... We have parts of the property that are so thick that you can’t walk through it. It’s just dead. It’s just fuels. It’s just read to go. So ready to go, it’s just frightening.

The individual stated a combination of factors including time and finances that made fuel mitigation not feasible at the time.

In the range of wildland urban interface property owners there existed a small group of permanent residents who had experienced the same Jocko Lakes Fire but were not particularly provoked, scared, worried about the implications. They did not believe the Jocko Lakes Fire had really posed a danger to residents. The reality that over half of the Seeley Lake population was evacuated during the fire was considered more a nuisance than an indicator of the serious nature of an urban interface wildland fire:

Well I guess I was never really afraid and I’m not being macho or anything like that. I just never really thought... I had a pretty good idea where the fire was... Where it was headed... Where we had a good buffer between us... the lake being the first thing and then the highway. So I guess I never really thought we would be threatened here... I felt it [*public evacuation*] was needless, but at the same time understanding that with this many people and few escapes.... They couldn’t gamble on having people trapped in here. I don’t think that there was anytime I thought we were in jeopardy that much.

These same property owners had who were not “scared” from the events of the Jocko Lakes Fire were individuals who had implemented any fire prevention efforts on their land. These property owners often cited several disincentives about hazard fuel

mitigation, such as, a potential loss of privacy with thinning the vegetation on their land. In comparison, property owners who were concerned about the implications of a wildland urban interface fire but had not undertaken fuel mitigation stated barriers to the process. For example, the expense of hazard fuel mitigation was cited as barrier by all three types of property owners - permanent, seasonal, and undeveloped property owners.

Alternative information sources on hazard fuel mitigation

Property owners cited interaction with local timber or “logging” contractors and professional foresters from the state and federal government as sources on information on fuel mitigation. This correspondence served to both educate and motivate landowners. One property acknowledged she had moved to the Seeley Lake area to enjoy the beauty and seclusion provided by the forested landscape. Her perspective on fuel mitigation changed after hiring a local contractor to remove just a few dead pine trees. The contractor provided recommendations on the need to eliminate other trees and vegetation for both forest health and fire prevention reasons:

We moved here full time in 2004. That following spring we hired some private loggers, sawyers, to come in and work. We listened to their stories about the land. The difference in my strength of opinion – not to cut a tree versus where I am today really came from being educated by people in the field. He really helped to educate me why. He has also seen such a change in me from being somebody who said – “I bought this land to live in the trees and if I wanted to live in the prairie I would have stayed there, so leave me alone” to “Oh-my-gosh if we don’t do something we’re not even going to have this place” – that’s what has happened.

A few individuals stated undertaking fuel mitigation after reading the need for fire prevention *and* the availability of financial assistance in print sources, such as, the local newspaper and homeowner organization newsletters. A seasonal resident who had recently moved to Montana from Connecticut admitted having no direct experience with wildland fire outside of one “smoky summers” in Helena. He read about the need for fire

prevention work and the availability of grant money in the local newspaper, “I’m a smart guy... I have read about the arguments for cutting versus not cutting. When told, I listen.”

For many property owners, friends and neighbors served as other sources on information on fire prevention and fuel mitigation. The owner of an undeveloped parcel of land, initially purchased by her late husband as an investment, decided to “clean-up” the property after being informed by her neighbor, “My neighbor in Great Falls described the work that needed to be done [to the land in Seeley Lake].” In addition, the fire prevention outreach efforts of homeowner organizations were cited as a source of information by permanent and seasonal residents plus the owners of undeveloped land. A gentleman, who had purchased an undeveloped lot within a homeowner organization, admitted he had never actually stepped-foot on his land. He decided to implemented fuel mitigation after receiving an informational letter and follow-up phone call from his homeowner organization: “They asked if I would clean up my land. They called because of the pine beetle trees and the fire hazard.”

In examining the data, the majority of undeveloped landowners mentioned contact through their homeowner association as a resource of information and assistance with hazard fuel mitigation. Some homeowner associations (HOA) sent out newsletters, special informational packets on fire prevention, plus posted information on their HOA webpage. Other associations held summer picnics where guest speakers included local and regional professionals in fire prevention and management. One HOA even had a volunteer fire prevention and safety committee that would assist permanent, seasonal, and

undeveloped property owners with grant application forms and finding a reputable timber contractor.

For the group of property owner who did not implement fuel mitigation, information on fire prevention was not given much attention. These property owners did not have interest in undertaking fuel mitigation and as a result the outreach materials were ignored. One couple admitted the fire prevention materials sent by their homeowner association went unread, “the information they’re passing on we really haven’t paid attention to it. So I really don’t know very closely everything they are telling people.” In addition, they had not attended any of the meetings or sought any advice from members of their homeowner organization fire prevention group:

We haven’t been to any of the classes or demonstrations or any of that stuff regarding fuel mitigation measures. I know there have been some. I guess there are some other people in the [homeowner organization] that come around and help you with determining what to cut and how much to cut and everything. We haven’t done any of that.

In conclusion, there were numerous and varied sources of information that property owners responded to with respect to the implementation of hazard fuel mitigation. Several permanent and seasonal residents cited their experience of an urban interface fire as a stimulus. However, other residents were unaffected by the same experience. For other individuals, the outreach efforts of other friends, neighbors, and logging contractors resonated with property owners and served as a source of information and motivation. In contrast, several property owners admitted to paying little attention to the information or fire prevention activities offered by their HOA as they had no interest in undertaking fuel mitigation on their land. Their justification will be expanded upon throughout the findings.

PERSPECTIVES ON WILDLAND FIRE AND FUEL MITIGATION

The effectiveness of hazard fuel mitigation in stopping wildland fire

Property owners who had implemented fuel mitigation believed the Seeley Lake would experience urban interface fires in the future and used with the phrase - “it’s not if but when” to demonstrate their conscientiousness as WUI property owners. The purpose of fuel mitigation wasn’t to prevent any fire from occurring but to keep fires manageable by fire fighting resources:

I mean we’re not going to *stop* a fire. It’s going to happen. It’s more fightable. A lightning strike hits here and something flashed up, they can put it out in an hour, as opposed to something thick.

Property owners were also cognizant of the limited fire fighting resources available to protect property during a significant wildland fire event. For one couple their tour of the Bitterroot Valley after the 2000 fire season convinced them of the need to take fire prevention measures around their homes and surrounding landscape:

We went down the Bitterroot and it became evident to me that if you had a lawn, you had a house. And if you didn’t have a lawn, the roof was in the basement. It was - I’m a black and white guy - it was that black and white. There aren’t enough resources to protect my house... So when the event comes - and it will, that’s a given - there is no way in god’s-green-earth that the Forest Service, nor the local fire department, nor the State is going have enough resources to protect this building.

Like wise, another property owner, who had just finished building a summer-recreational home during the time of the Jocko Lakes Fire, also recognized the limited capacity of the local fire fighting resources. The onus for protection would be on the property owner:

Anybody has to recognize with the rural fire district or even Forest Service crews, your chances of getting any help on your property living that far away, off the main road, is going to be *nil*. About all you are going to get is an evacuation order.

Only one individual who had implemented fuel mitigation thought his efforts had earned him the privilege of fire protection by local fire suppression resources: “I have done work on my property... I’m counting on the fire chief to be at my place.” The majority property owners who had implemented fuel mitigation recognized their susceptibility to future impacts from a wildland fire because of their proximity in the wildland urban interface. They believed the purpose of fuel mitigation was to reduce the amount of fuel so a fire could be more easily contained and controlled. In addition, fuel mitigation provided a measure of self-protection during large fire events when firefighting resources could be engaged with critical duties at other location than their property.

Compared to property owners who implemented had fuel mitigation, those who had not often stated several reasons for their decision. These property owners cited paying fire insurance as a means to cover the potential losses from a destructive wildland fire. Additionally, they believed fuel mitigation would not be effective in modifying potential fire behavior due to other intractable factors. These factors included the topography surrounding their lands, access routes for fire fighting resources, and the summer weather during a fire season:

I have a sort of contrary attitude towards this in that I pay faithfully my fire insurance and if there is a forest fire that starts at the bottom of this hill, nobody is going to stop it. Right? It is a west-facing slope [and the] winds are from the west... It’s coming up and there is no way for fire equipment to get in here and get out safely. So that fire is comin’ and if the whole forest burns down, I just as soon the house burns down. I’ll go get my money and go build some place else.

With professional training and experiences as a wildland firefighter another property owner admitted this knowledge influenced his decisions not to undertake fuel mitigation. The location of his property coupled with the belief that an established fire

would be difficult to control warranted restraint in altering the forested landscape around his permanent home:

I was on the fire crew for three years when we first moved here. I'm no expert but I had fire classes and had seen fire behavior. And I think there's a realization that if a fire makes a run up this hill - it's coming. If it [*fire*] is any size at all and the fact that we cut a few trees around our house might help... It might not help.

A difference between the two groups of property owners tended to be their views associated with wildland fire behavior. Those who implemented fuel mitigation believed this endeavor would provide protection in the event of a wildland fire. Property owners who did not in engage in fuel mitigation regarded the work as a futile endeavor. Among the property owners who chose not to implement fuel mitigation, several described large, destructive wildfire events. In their estimation because fuel mitigation could not provided protection against large-scale fire events, the work seemed unwarranted, as noted by one permanent resident, "In a year like the Jocko Lakes Fire, I don't care how much mitigation you do. I don't think it's going to make a whole lot of a difference." Absent from their statements were the expressions used by property owners who had implemented fuel mitigation. They described the goal as "keeping small fires manageable" or allowing firefighters "half-a chance."

The property owners who completed mitigation work seemed to have a more robust picture wildland fire. In their opinion, there was a range of circumstances where fuel mitigation would provide protection. Lightning ignited fires and the occasionally escaped campfire could be corralled: "I think we have a better chance of keeping it small... We have a better change of fighting it." The treatment of property allowed for more effective fire suppression efforts during large fire events, as noted by one permanent resident's description:

If it just so happens that the wind ain't blown' and we have got a place where you can put people out of harms way, things can happen. At least you can dig hand-line and have half confidence that it is going to work - that the fire will not cross that bare ground.

In addition, the thinning of tree canopies allowed aerial fire suppression resources to be useful: "You need to open up the canopy enough to where it would make a difference if they dropped retardant... It would get through."

The property owners in both mitigation groups acknowledged the potential of highly destructive wildland fires. Those who implemented fuel mitigation believed the work at least afforded the prospect of protection. In addition, under less extreme circumstances the results of fuel mitigation allowed fire firefighters the opportunity to control and contain small wildland fires. Referencing the analysis table, the concepts - "hazard fuel mitigation keeps small fires manageable" and "reducing impacts from large wildland fires" - accounted for statement from two-thirds of all property owners who had implemented hazard fuel mitigation. Among the property owners who did not implement fuel mitigation, one-third of property owners cited the work as a futile effort.

Protection of personal investments

The protection of property from potential damages caused by a wildland fire was an incentive cited among permanent and seasonal residents plus the owners of undeveloped land. All of the permanent residents who had implemented fuel mitigation mentioned protecting their land and structures as a reason for completing the work on their property. One couple, who spent several years converting their summer cabin to a permanent residency, hired contractors to complete fuel mitigation on their lands, "We have been working on it since we have been living up here as far as trying to keep from getting burned out. We have a lot invested, yeah know."

A few permanent residents believed the changing demographics to the Seeley Lake area influenced a property owner's regard for hazard fuel mitigation. Property owners, who had initially purchased undeveloped land, eventually built their so-called "dream home" or "retirement home" and wanted to protect this substantial investment. One such individual noted the differing attitudes among permanent residents and those who owned only a seasonal residence - the "summer cabin" - or undeveloped land:

There is an interesting mix now as the area changes from cabin owners to homeowners. You have the cabin owners and they don't care. I mean they care but it's not a primary thing to them. Yet I am a homeowner... I have everything I have ever earned socked for the rest of my life on this piece of property and I care greatly about fire. I don't want it to burn up in a fire.

There were seasonal residents whose statements did support the view that permanent residents more readily implemented hazard fuel mitigation in order to protect their considerable investments. The owner of a modest summer cabin who had not implement fuel mitigation noted: "There is a whole different mind set between the full and part time residents." The individual admitted that although his cabin contained many items of sentimental value, "not everything in the world" was located in one place, in contrast to many permanent residents to the area. He thought many part-time residents in his homeowners association preferred to keep the landscape rustic where "every cabin has a fire pit that folks sit around in the summer" versus full time resident who had manicured appearance to their property, including "green lawns and flower beds."

There was however, no absolute pattern distinguishing the behaviors and views of permanent residents and part-time residents regarding their choice to implement fuel mitigation. There were seasonal residents and the owners of undeveloped land made assertions that hazard fuel mitigation was accomplished to protect their assets. For one couple, who had purchased an undeveloped parcel land in the late 1980's, undertaking

fuel mitigation provided insurance that the land would retain value and would be a desirable location for building. The couple had plans to gift the land to their children, “Our son is a builder, and we thought may be some day he would be interested in putting a structure there. Actually we are in the process of turning that property over to our children.” Continuing the family tradition summer recreation in the Seeley Lake area was an incentive for another couple in their effort to protect a modest summer cabin. They implemented mitigation work so their grandchild could also enjoy the opportunities afforded by the area, “We didn’t want it [cabin] to burn down... That is will be there for my grandkids and if a fire comes through it won’t sterilize the land... That it will be there for others to enjoy.”

For those property owners who did not implement fuel mitigation private assets were covered by other means. As previously mentioned a few individuals believed homeowners insurance was enough compensation in the event a destructive wildland fire impacted their property. Several individuals who had built the majority of their permanent home or seasonal residency mentioned having the capacity to rebuild at the existing or in a new location. The combination of financial assets and skills necessary to build a home allowed for latitude in observance of fire prevention measure, “I don’t want anybody running in to save my home. I’ll take that risk. I can rebuild a house in 70 days.” For another gentleman past employment in residential carpentry work influenced he regard for fire prevention:

Having done carpentry work all my life and building. I’ve tried to rebuild a couple of houses that were partially burned and I tell people that if my house catches on fire – “You’d better not call the fire department. I don’t want you to calln’ the fire department.” I want the house to burn to the ground. I know you are going to lose some of your personal effects but I don’t want to be back in here trying to rebuild a house that has been partially burned. You never get rid of

the smell. Structurally you never know – is it sound? Is it not sound? It’s just a real mess. So I don’t want to have to deal with that either.

The degree of financial obligation property owners possessed was another factor that could be attributed to the acceptance of risk and latitude in implementing hazard fuel mitigation. One retired couple that had been among the original group of property owners to build a permanent structure in their homeowner organization. They noted the change the type of structures built in the area:

Well we look at things a little differently because we are one of the first landowners back when it was reasonable to purchase land. We built our cabin. We paid for it as we built it. So we look at it differently than some of these people who put so much money in their home. If I had one of these \$300,000-\$400,000 homes? So we probably have a different attitude about that [hazard fuel mitigation].

For this couple their home was neither the location of all their financial equity nor a source of major financial obligation. Proverbially not having all their eggs in one basket allowed hazard mitigation to be regarded as optional versus critical in the protection of property. This couple also mentioned rebuilding in the same location if a wildland fire did destroy their existing home. Although the structures were gone, they still owned the land which held value, “I keep thinking - “God never closes a door if he doesn’t open a window.” Yeah know, I think that’s part of life... But the land... Of course I’m a farmer’s daughter and land is land.” Although the personal losses from a wildland fire could be substantial, the event wasn’t ruination but an alternative pathway in life and the ownership of land afforded future possibilities.

Tied to the implementation of hazard fuel mitigation was the range of opinions on the value of structures and property. Appropriately many individuals spoke to the protection of their investments as an incentive. They believed fuel mitigation was a necessary indemnity. Others believed their insurance was situated in other areas,

including the skill and financial capacity to relocate or rebuild if a destructive wildland fire damaged their property.

ESPOUSED VALUES

Personal responsibility

The concept of personal responsibility was the value cited by the most property owners. In examining all groups and types of property owners nearly 40% of property owner spoke to the concept of personal responsibility. Personal responsibility included being of aware and engaged about the implications of living in the wildland urban interface. One permanent resident articulated that WUI residences couldn't live "la la land" and have a "rainbow attitude" about their surroundings. Property ownership required a trade between enjoyment of the surrounding landscape and amenities afforded by the area and a responsibility to be conscientiousness about fire prevention:

I think it is too much to expect that you don't have to take any responsibility on your property but those firefighters better be in there putting that fire out when it happens. I think in terms of the WUI there is a responsibility there and if you are going to own that land and enjoy the beautiful views and so forth that there is a responsibility to thin it... To maintain your property.

These property owners believed personal responsibility should include the implementation of hazard fuel mitigation. Responsible individuals ought to achieve a measure of fire protection on their land and not rely upon firefighting resources for aid in the event of a fire. Two separate property owners, one the owner of undeveloped land and the second a seasonal resident, provided their sentiments on personal responsibility, "I don't care to be one of those statistics. Sorry to be on my soapbox but if you build in the woods it's not the firefighters responsibility to foam your house. We need to pro-active living here" and "There is the need for personal responsibility - to take care of your property and not rely on outside assistance during a time of crisis."

Property owners who had not implemented fuel mitigation cited the belief of personal responsibility. Here too, property owners needed to reconcile the potential consequences of residing in the WUI. Concurrently, these property owners did not expect fire resources to provide assistance to save their structures and property during a wildland fire:

I'm one of those individuals that doesn't expect... In fact I don't even want them... If a fire starts I don't even want them to try to save this house. And I don't believe they should. I don't believe that is their responsibility. The people who built here, it is their responsibility to do whatever they individually can and need to do. If you are successful fine and if not, well move on. Go do something else. Go live someplace else.

This individual had a preference for the forested appearance of his property and believed fuel mitigation work would provide little protection in the event of a significant wildland fire.

Unlike property owners who had implemented fuel mitigation, these individuals had other beliefs, perspectives, and constraints that outweighed their decision to undertake this fire prevention effort. One permanent resident thought property owners needed to assess their decision about residing in fire prone landscapes before substantially altering the area with fuel mitigation. Personal responsibility started with understanding the ecology and the implications of living in the western United States:

The bottom line is you live in the West where it's dry... Fire has always been part of the ecosystem... You've got to assume there is a certain amount of risk. Yeah know, you choose to live here and you've got to realize – “well this could burn up.” It's just a fact. To totally alter the landscape just to preserve your personal property when the fact is we are really invaders here anyway... It [*HFM*] just doesn't make sense to me.

Another permanent resident cited finances and time as major constraints to fuel mitigation yet believed that the obligation for fire protection rested with the property

owners. Speaking to the possibility of destructive WUI fire she stated, “If it does, we have made our bed. We reap what we sow. We have chosen to live here.”

The “good neighbor”

The concept of being a “good neighbor” was a perspective declared by several individuals and similar to “personal responsibility” this value was stated by all three types of property owners - permanent, seasonal, and undeveloped landowners. Being a good neighbor required landowners in the wildland urban interface to have consideration for the safety and well being of their fellow citizens, “I think that if you are living in the woods you have a responsibility to yourself and everybody else to take care of your property... to make sure you don’t put body else in endanger.”

Concern for your neighbor required property owners to undertake hazard fuel mitigation to reduce the amount of fuel, which could be consumed in a WUI fire. Property owners whose lands lacked mitigation might contribute to fire behavior, making the control a wildfire more difficult for firefighters resources. One retired couple’s decision to undertake a hazard fuel mitigation project was influenced by the location of their property at the base of a steep hillside. In the event of an ignition, untreated fuels, topographical location, and local weather could combine to produce significant fire behavior. The potential impact other property owners influenced the couple’s decisions:

That was a thought I always had in my head – that we on the bottom end here really needed to take care of our problem because these people up above... I mean if we burn, they’re going to burn and we are much more likely to burn, I think. A cigarette tossed off into dry grass down here and it’s going to go. And with more vehicles down here, with the sparks being thrown... I just felt that it was a good neighbor thing to do because if we burn it’s going to sweep right on up the hill.

The owner of several undeveloped lots that were located in a homeowner association admitted a wildland fire would have little disruption to his daily life as an out-

of-state resident in Spokane, Washington. The incentive for undertaking fuel mitigation was done with consideration for the residents who lived near his property:

Fire is not a risk for me. It's important to respect their concerns, especially the permanent residents. I've got to do my part of keeping things cleaned-up... I want them to be happy. I wouldn't want a fire on my property to spread onto them.

A few individuals spoke to the "good neighbor" concept that extended beyond the direct vicinity of their property. One advocate, a seasonal resident who recently completed construction on a summer home, admitted to having little personal experience with wildfire except a few "smoky summers." He read about the need for fuel mitigation in the local paper and contacted the Bitterroot RC&D about the availability of grant money and educational assistance. The gentlemen believed fuel mitigation was required, especially with his properties location next to State lands: "I am up against the State lands. If I'm not responsible, the rest of the homeowner association could burn." A fire started on his property would need to be confined and not easily spread to State lands which, at the time, were densely forested and contained numerous pine trees damaged by the mountain pine beetle. A fire in this location would be difficult to control and could possibly moved onto other private lands.

Private landowner associations also embraced the "good neighbor" conduct. One homeowner organization was platted to where the individual property lots were typically a quarter-acre in size but the group collectively shared a 60-acre parcel referred to as a "common area." This common area land was located along the only access route into the home sites and directly adjacent to U.S. Forest Service property. The homeowner association hired a timber contractor to mitigate the hazard fuels based upon the threat these untreated land could have to the greater locale. One permanent resident noted the

responsibility of the homeowner association, “how long does it take to get to Seeley Lake? We could have burned out Seeley Lake because we didn’t take care of our hazard here... We’d burn out Seeley Lake!”

Within the group of property owners who had not implemented fuel mitigation, only two permanent residents cited how their lack of fire prevention work might result in adverse repercussions for their neighbors. The one individual admitted her family’s unmitigated lands could affect her neighbors, “But if our neighborhood were to go, I would be hugely responsible for it.” For the other residents, the desire for privacy trumped altering the existing landscape to his property:

This steep hill presents a problem in itself. The wind, there’s probably a funnel coming up this draw right here, so for that reason we are probably in a pretty high-risk area. Our neighbors are probably looking at and saying – “I’d wish they’d thin their stuff out because they are putting us more at risk.” That maybe true too. Part of the reason for being here is the trees and the undercover. We like the undercover and that kind of gives us a buffer from our neighbors and it keeps the noise down and the lights.

Even with a solid understanding of the elements that lend to destructive fire behavior - a densely forested landscape, potentially windy weather, and steep topography - the disincentives of fuel mitigation outweighed fire prevention efforts. The want of privacy and wildlife habitat were more essential than risk reduction activities for either personal or common protection. Taking “personal responsibility” and being the “good neighbor” were optional considerations. Without any type of mandatory regulations or financial penalties a property owners had discretion in regard to undertaking fire prevention measures on their lands.

Stewardship

Property owners spoke of the need to actively manage their property for reasons that included but were not exclusive to hazard fuel mitigation for fire prevention. This

active management of private lands was regarded as the stewardship. Comparable to “personal responsibility” and being the “good neighbor,” stewardship was an important value held by property owners.

A third generation Montana farmer who was the owner of several undeveloped parcel of land believed property owners were by default “stewards” and as such obligated to plan and to engage with their property, “we are stewards to the land. We interact with nature. We are part of nature and need to act intelligently.” The individual offered his strict opinion of property owners who did not engage in the care of their land, “some folks don’t want to be bothered with the time frame and effort... Shame on them for not taking care of their property. [They] fear it will cost them a lot of money.” Even those who had not implemented fuel mitigation employed the term of “stewardship” when describing their decision-making. The obligations required to run a small business left one owner with little towards the management of her family’s property. The lack of engagement in managing this land did weigh upon the individual:

I feel like I am a horrible steward. I feel like I adopted a child and beat it... No, no that’s how I feel. That’s how I feel. I have got these beautiful ten acres that needs to be loved and it’s not. It’s just killn’ me. It’s got knapweed. It’s got thick woods. It’s got my husband’s junkyard.

These two individuals utilized particularly description language to express their beliefs about landownership. Both judgments and proclamations of guilt were offered for negligence in the management of private property. For many individuals personal values guided their regard and engagement in landownership. The values of “personal responsibility,” “being the good neighbor,” and “stewardship” were woven into the reasons and justifications property owners offered for implementing, or not, the fire prevention endeavor of hazard fuel mitigation.

THE ACTIONS OF STEWARDSHIP

Healthy forest

Specific activities that property owners mentioned in conjunction with “stewardship” included modifying the existing timber and vegetation to accomplish fire prevention, to improve the forest health, and to deal with damages from the mountain pine beetle. Property owner in both groups spoke about “healthy forests” as one incentive for undertaking fuel mitigation. In all just under 40% of all property owners mentioned the concept of healthy forest. As both permanent residents and owners of a business in Seeley Lake one couple stated, “we mainly became active on our property, making sure we are good stewards of the land. And I’m not a person that doesn’t want to cut a tree.” Pressed for what constituted being a “good steward,” the answer was management to achieve a healthy forest, “The health part is because it [the forest] is deteriorating because of the drought and the density of trees in some of these areas.” What constituted a “healthy forest” varied among property owners and was based upon individual perceptions of current forest conditions.

Nearly all property owners who were permanent or seasonal residents to a homeowner association (HOA) spoke to the existing covenants. These covenants outlined specifics for property maintenance and appearance. Among different homeowner associations there were slight variations in content of covenants, but a basic tenant was to keep in tact the densely forested landscape of the area. As noted by one property owner:

This area was settled with the idea that everybody was going to have a log cabin in the woods. That was the frame of mind of the founding fathers. The people that wrote the rules... The covenants said “You can’t cut more than 10% of your trees in any given year.” Forever that was the rule.

Based upon legal issues, most homeowner associations did not change the content of the covenants but overlooked their observation to accommodate for the implementation of hazard fuel mitigation. Most HOAs actually encouraged property owners to implement fuel mitigation through print and Internet based newsletters. Some larger homeowner associations even held picnics and barbeques during the summer months where a fire management professional spoke on behalf of prevention measures plus availability of educational and financial assistance.

Even with the changes to the rigorous surveillance of homeowner associations covenants, many property owners believed these rules had contributed to the current mountain beetle infestation, “The reason where I live that people’s trees got so bad is that they [HOA] didn’t want people cutting any trees unless [it was] authorized.” The covenants also exacerbated the fire danger urban interface, “When we brought the property, the rules were very strict. If you wanted to cut any trees you had to get approval. The philosophy was to insert your structures in and around the trees.”

Property owners spoke to the historic fire years of 1910 and 1929 and thought the existing forests around Seeley Lake were regenerated from these events. Without any further wildfires, the current forested landscape was in a decrepit state:

This forest burned in 1910 long with the other 7 million acres... So we have a forest now that is a hundred years old... And guess what, the forest lives a hundred years so it’s gonna die... So the only thing that makes sense is to clean up the mess.

Other property owners mentioned the commercial timber industry, which had operated in the Clearwater and Swan Valleys. The decline of the industry had left forests without management for decades, “This was thinned in 1960 or something around there and so it is 40 years later and all those ponderosa pine are stunted... They are so close

together and they never could get back into thin it.” Regardless of historical accuracy individuals believed the forested landscape of Seeley Lake required natural or human disturbance to create a “healthy forest.”

“Healthy forests” had specific attributes that included tree size, tree density, species diversity, the presence seedling and sapling sized trees, plus absence of dead and dying lodgepole pine. One permanent resident believed he had accomplished a combination of objectives from implementing fuel mitigation work, including a healthy forest. Reducing tree density so the remaining species could be afforded more space, water, and nutrients had allowed for a healthy forest on his property:

I know that if the trees are spaced out and there is 30 feet between crowns, you are probably going to have a healthier forest than one that has a jungle on the ground because every tree is competing for whatever resources there are... And if you can get the crowns spread out than each tree has a better chance to flourish. I use the term “come to live”... We can see that on our own property. We can look at the stuff that was fifteen feet high and now it is twenty-five feet high... And that to me is [a] healthy forest.

One property owner even proposed that fuel mitigation might not only provided protection of the existing forested landscape but also could allow for benefits similar to the intentionally planned and implemented prescribed fires undertaken by state and federal land management agencies:

If you don’t want your property to burn and have every tree on there scorched and dead – you can put defensible space and plan for a healthy forest. May be if a fire does come through it may not kill all your trees [but rather] spur some new growth and that kind of thing.

Although it is not know what specifically was meant by “spur some new growth,” the significance is that property owners believed not all wildfire was not destructive. Modifying fuel conditions could allow for a type of wildland fire that might produce ecological benefits. This shift in perspective from decades of adhering to the Smokey

Bear campaign, which represented wildland fire a dangerous and destructive force of nature, to an understanding and acknowledgment of fire as a beneficial process is significant. Inhabitants recognized disturbance, including mechanical thinning and wildfire, was necessary a component to forested lands, even in the urbane interface. The land needed to be actively managed to produce “healthy forests.”

The mountain pine beetle and healthy forests

Several property owners spoke to forest health and dealing with impacts from the mountain pine beetle in tandem. Starting around 2005 pine trees species started to show significant mortality to the mountain pine beetle. Depending on the stage of pine beetle infestation, property owners sought to remove the already dead and dying trees, to prevent any further mortality their pines, or to avert the incurrence of the mountain pine beetle all together. One landowner admitted the work he had contracted was done for fire prevention but added - “its not specifically fire, but also healthy forests.” When articulating what constituted a “healthy forest,” the absence of dead and dying trees was the primary attribute, “healthy forests I would say would not have dying trees... would not become full of dying trees.”

Other property owners thought the removal of infected pine might impede any further infestation of the beetle on his property, “the main reason for the work, besides [removing the trees] once they were dead, was that beetle was going to infect more trees.” Preventing the beetle from infesting any pine trees on their lands was the goal of one family. Their interpretation of a healthy forest included trees that were not infested with the mountain pine beetle, “we want a healthy forest...We didn’t have it [mountain pine beetle] in our trees so we wanted to keep it from coming in.”

Several property owners mentioned their undertaking of fuel mitigation involved the preemptive removal of all lodgepole pine from their lands. Observing the impacts of the mountain pine to other portions of the Seeley-Swan Valley, one couple hired a contractor to remove every lodgepole pine tree as part of their hazard fuel mitigation work:

We looked down the valley there and you could see the patches of red coming up the valley. We were also looking at the species composition on our property and one of goals was to eliminate all of the lodgepole pine on the property so we didn't have the beetle infestation issue.

With substantial beetle damage to lodgepole pine, the tree species was regarded as almost a nuisance to property owners. The natural growth and stand composition of lodgepole - as a small, straight, slender tree tightly bunched in "dog-hair" stands - was regarded as unhealthy and problematic. For many property owners, the severity of mountain pine beetle infestation was blamed upon a lack of proper management, "we are in this bug thing because of so damn many lodgepole are crammed together so tightly. They can't defend themselves." Several landowners thought lodgepole pines were supposed to be thinned and maintained in commercial timber type stands.

From all the interviewed property owners, only two individuals referenced the mountain pine beetle and the infection of lodgepole pine as part of a natural cycle indigenous to the area. One individual admitted his inquisitive nature lead him to pursue information on the pine beetle:

I've made a big effort of understanding better the life cycle of the beetles ... How they work... How they interact... How they kill trees and I have tried to share that information with people who are interested.

The gentleman believed he implemented fuel mitigation in a manner that provide for "the longevity and health of forest" including minimizing the taking of lodgepole. He thought

the current practice of clear all lodgepole from a property was possibly nearsighted and unnecessary. With considerable financial resources, the property owner was able to annually accomplish an assessment and management to his ten-acres of undeveloped land. He was also cognizant that his approach may have been just wishful thinking:

I mean the beetle is part of that natural cycle and so do you let it go or do you try to manage it? I don't know may be it gives me some sense of control where it is false or real. May be I'm doing something worthwhile and good to help this. It feels that way, but in the whole scheme of things - you fight Mother Nature and usually you lose.

Hubris

The manipulation of nature - the achieving a “sense of control” - is where property owners who had not implemented fuel mitigation reserved their strongest opinions. A few permanent residents thought attempts to manage natural process including wildland fire and the mountain pine was counterproductive and even impudent. One permanent resident called the effort of fuel mitigation for fire prevention a prideful endeavor:

One of the problems is the hubris with which human being act. That is we encounter a problem that is generally because of something that we did and then we think we have a way of taking care of that problem that's better than the natural way. So we excluded fire and created the problem we have here now with over grown forests, etcetera. We perceive a problem and now we think we know the best way to do it which is to start cutting down a lot of trees. But the best way to do it is to let Mother Nature take over again and let the fire go through.

These property owners were neither fatalist or apathetic about fire prevention in the WUI. Wildfire wasn't a force a nature viewed as uncontrollable and destructive but rather an essential process, which did and should again occur in the Seeley Lake area:

I mean fire has been here for millennium. [It is] part of this ecosystem and it would be if it wasn't for fire fighting. Of course the Forest Service has what – for a hundred years suppressed fire and now we're in kind-of a mess where we really do have too much fuel. To get back to a more natural balance we are going

to have to have more fire. That's what's going to happen. Of course most folks don't want it on their property but, yeah know, it's going to be on somebody's property.

Both groups of private property owners, those did and did not implement fuel mitigation, believed the past management practice of suppressing wildland fire had been a mistake. Many individuals understood that excluding wildland fire had altered natural processes and lead to unhealthy and excessive fuel conditions on private and public lands. Several individuals that chose not to undertake fuel mitigation believed the endeavor was not a solution but rather a process that continued to tamper with nature.

A few property owners thought the results of hazard fuel mitigation would actually amplify fire behavior if a fire started in their proximity. One retired couple admitted to being stressed by the resulting conditions of a mitigation project that had occurred on a neighbor's land. The contractor had done little to clean up the residual biomass of tree limbs and tops. In addition, the tall grass that replaced the once forested area was considered an even worse fire hazard: "We were so frightened because if there were a fire it would have hit there and come right up here [their residence]... It would have burned pretty fast through that grassland. It still could." With the couple's residence situated above the neighboring property, they believe additional fire prevention measures would be needed for their security, "to mitigate it, we are going to have to put some breaks in it to kind-of control it [potential wildland fire]."

Another couple had concerns about the impact of fuel mitigation upon witnessing the changes to the climate and the vegetation after several of their neighbors had engaged projects:

I guess my concern is we used to walk in those old growth forests before the logging [fuel mitigation] even occurred and they were cool and they were damp. And then you go into after the logging has occurred and it is dry and it is open.

To me that is more of a danger. So to me I have never understood fuel mitigation, really.

They believed “getting rid of the junk” such as dead trees and downed logs but thought the thinning of mature trees actually exacerbated fire conditions. The loss of shade provided by the tree canopy only dried out the existing vegetation, making these plants now readily available as fuel in the event of a wildland fire. A dense, mixed conifer forest was supposed to blanket the landscape of Seeley Lake. Hazard fuel mitigation altered natural conditions and did little to alleviate potential fire danger.

Private property owners had divergent opinions on the efficacy of hazard fuel mitigation. Those implementing mitigation believed they were being stewards of the land. Their work was actively restoring healthy forest, reducing wildland fire risk, and perhaps even allowing an urban interface fire to provide benefits, such as, regeneration. In contrast others saw human interaction of fuel mitigation as destructive to forests. These individuals cited the error of past fire suppression activities and thought continued intervention wasn't a viable solution. Letting wildland fire move through the area was the right course of action for restoring healthy forests, as noted by one seasonal resident:

Let nature take care of it [fuel accumulations] rather than man with machines... It should be done naturally. Fire gets a natural regeneration... These things are supposed to happen.

These property owners were advocates for natural occurrences of wildland fire. They anticipated and accepted the possibility of a severe wildfire extensively altering the land they enjoyed as property owners.

When property owners spoke to their reasons for fuel mitigation, they justified their decisions with talk of personally held values. With regard to wildland fire, these values influenced what measures were essential in the management of privately owned

land. Some individuals deemed human manipulation of the land was a requirement while other believed no action was the correct path in property ownership.

BARRIERS TO HAZARD FUEL MITIGATION

Barriers to hazard fuel mitigation included statements given by property owners who had either completed or had not commenced a project. Property owners spoke to the difficulties they encountered in the process of completing a project. Other landowners, who were advocates of fuel mitigation, cited obstacles that prevented even initiating fuel mitigation work.

Financial issues of hazard fuel mitigation

The cost of hazard fuel mitigation was cited by property owners willing but unable to undertake fuel mitigation. They could not afford the expense of hiring a timber contractor to complete the work. One-third of permanent and seasonal residents plus all undeveloped landowners cited the cost of fuel mitigation as a reason for not implementing mitigation work. A permanent resident admitted her present concerns were focused on being the proprietor of a small business:

I mean I made the mistake... I made the mistake of investing everything we have into this... All of my time and all of my money has gone here [*business*]... If I wasn't putting every ounce of my energy into this place it would go there [*private property*]. So if I could sell this and focus on my land, that's my dream. If I could go home and protect my land, I would be thrilled.

The type of fuel mitigation in Seeley Lake area often required the removal of mature trees. The work was often beyond the physical capacity and skill of many property owners, "I can't drop them myself they are a little beyond my comfort zone so [I will] just have to get someone in there to drop them." Property owners had also concerns with the felling of trees around the WUI infrastructure, "I'm going to have to have somebody come in now because I've got some real big trees with power lines close by. I'm not that

good a sawing... at least I want somebody else to take responsibility.” Fuel mitigation work required the skill and expertise of professional contractor loggers. Only two out of 30 property owners completed a fuel mitigation project with out the assistance contract loggers. The cost of hiring a contractor logger was expenditure outside the resources of several property owners. One retired couple looking to complete a modest amount fuel mitigation work admitted the fee was beyond their means, “I realize they are trying to make a living [but] no one can afford to pay a hundred dollars a tree to have them [trees] fallen... I said [to the contractor] - “I can’t go that.”

Several property owners admitted the completion of a project was accomplished only with the assistance of federal grant money. The Western States Grant afforded a 50% - 50% cost share, meaning a property owner would be responsible for half of the final expenses to project. Any merchantable timber taken by the contractor was subtracted from the overall cost and then grant money was applied to offset half of the remaining expenses.

Among the undeveloped landowners, all three cited finances as the primary reason for not undertaking mitigation work. For one landowner the change in the amount of financial assistance provided by the Western States Grant made undertaking fuel mitigation unaffordable. In previous years, the grant allowed for 75% - 25% split to the final costs of a project. New regulations to the Western States Grant stipulated a 50%-50% cost share. This property owner admitted the extra obligation made fuel mitigation unaffordable. Another property owner, also a Western States Grant applicant, had undeveloped land in a location that was not designated as high priority for treatment in comparison to other applicants. The individual was willing to implement fuel mitigation

work and admitted he wasn't particularly pleased with being denied assistance. His judgment on the reality of limited annual grant allocations was perhaps misplaced:

I twice applied for the grant money only to find out both times that the money had run out. The grants were not funded. Like everything else the government is involved with, it got screwed up. [I was] wasting my time.

A couple who were seasonal residents to Seeley Lake admitted the fuel mitigation would not have been possible without financial assistance, "we just plain couldn't afford it without the grant. Without the grant we would still be up there trying to cut limbs off with a pole saw." Another permanent resident who started a modest amount fuel mitigation work during in the clearing of a building site for his home, admitted completing the effort only after receiving a Western States Grant. He noted the incentive of grant assistance in the implementation of hazard fuel mitigation:

I couldn't have done it without the grant. And obviously money talks. That's the biggest incentive for any landowner to do some thinning, the availability of grant money. It makes a huge difference.

Among the owners of undeveloped land who completed hazard fuel mitigation, 6 out of 8 or 75% received grant assistance to complete work on their property. One property admitted the grant assistance was a significant incentive. If she had to pay for all of the contracted work, the fuel mitigation would have been given more scrutiny, "If I had to pay out-of-pocket, I would probably would have gone and taken a look at the property to see how interested I would be in investing money."

Several factors kept the cost of contracted work expensive, including the amount of work on a particular property. Areas dominated by beetle infested dead and dying pine required substantial amounts of work. As a volunteer to his homeowner association fire

prevention committee, one retiree admitted the expensive of treating areas with beetle-damage was substantial:

For a lot of people cost is an issue. Even with the grants, it's hard for people to come up with the money you need to really do it right, especially with the situation we have here with almost all the lodgepole totally infected or dead. That's a lot of trees to take down and that's a fair amount of expense.

In addition, the local lumber mill paid contractors little for any beetle-infected lodgepole pine. Without merchantable timber to reduce contractor costs, hazard fuel mitigation on properties with substantial amounts of beetle-damaged pine trees was expensive. One property owner and former employee at the local mill noted fiscally complicated situation:

There got to be such a volume, there was so much of it [dead lodgepole] they didn't half to pay for anything to speak of really. I mean you had to get rid of your wood someplace and that was the closest place to it. To have it haul any farther than that would have been out of pocket expense to pay the contractors.

Tending to the residual biomass— brush plus tree tops, tree limbs and small sapling size trees – generated from fuel mitigation also increased the costs of a project. Within the Seeley Lake area there existed little local infrastructure that could utilize the residual biomass, such as hog-fuel for co-generation or chipped material for paper products. The contractors needed to slash pile and then burn these materials, a practice that was time consuming and added to the labor costs of a fuel mitigation project. A few property owners contemplated the alternative used for this residual biomass, perhaps a process that might produce benefit outside of fire prevention:

I would like to see somehow the timber that is being taken off some how used instead of just being burned up in a bonfire. That concerns me. We just talked about it this morning that so much energy went up in smoke. I don't know what the answer is but it seems that there should be a better use of that.

Other property owners wondered about the utilization of timber that had been damaged by the mountain pine beetle. This beetle often transports tiny mites that themselves carry spores of a fungus (*Ophiostoma minus*) into the phloem of a tree. The fungus proliferates and serves as food for the mite while leaving a blue-stain to the outer ring of the trees. As a retired timber worker, one gentleman believed the local timber mill was not taking any beetle damaged pine trees from contract loggers. He wondered about the possible development of niche markets for “blue-stained” timber:

The mill here doesn't take any of them any more... It's to bad somebody doesn't come up with a way to make some really fancy wood paneling because when the beetles kill the tree, there is a ring right around the tree that is blue. So it probably would be quite pretty.

There were numerous financial components to hazard fuel mitigation in the Seeley Lake area, including the cost of implementing the necessary work in a timbered landscape. Many property owners had to rely upon on a cost-share assistance to complete their fire prevention projects. Several property owners spoke to the current fuel mitigation practices and wanted for better ways to utilize the residual biomass generated from the non-merchantable timber. Some alternative markets might even offset the expensive slash-pile and burn practices of fuel mitigation.

Bureaucratic hassles – Western States Grants

There was range of response from property owners to the Western States Grant application process. Some property owners found the grant process manageable, while others needed to seek the assistance of friends and local logging contractors. The grant application form from the Bitter Root RC&D contains some fairly detailed information but the time and efforts were worth the financial assistance for some property owners:

On my end of it, there was some paperwork to do but it was kind of okay. I just kept thinking I don't want to pay \$2,500 to remove these trees, so I will do the

paperwork necessary. But there is always too much of that yeah know. I don't know how to get around that. Maybe that's just the nature of the beast. But I would do it again, it didn't scare me off.

One couple tried to tackle the grant application but admitted the information required was, "beyond our realm for a while." Only by looking at a finished application, did the couple complete the paperwork and continue with the grant process. Although no one admitted to foregoing the grant assistance because of the paperwork, the application is written in technical forestry terms and land management jargon. The requested information included naming soil types, prominent vegetation types, and "live streams adjacent to area." Property owners in one homeowner association used the assistance a fellow resident who happened to be retired contracting officer with U.S. Forest Service. A neighbor noted their fortunate situation in having help with grant applicants:

I do think the grant process is a hard one for people who are not acclimated or are not part of the industry. I think a lot of times that intimates a lot of people. For us, we were very fortunate because she was a Forest Service gal, so she was able to help. The grant application forms are pretty daunting for just a normal Joe.

The lack of communication from the Bitterroot RC&D was another inconvenience mentioned by some grant applicants. Property owners sometimes experienced little to no correspondence after completing the grant application. Some individuals were left wondering about the status of their possible grant assistance. As noted by one couple:

We filled it out in the spring and couldn't do it until the next summer. So it was a full year 'til everything went through. So I thought that was a long lag time there. So that's probably part of the paperwork process that gets hung up somewhere. I don't know what happened?

A different property owner believed she had followed "rules" at the time application but never received any further correspondence until a year after she and her husband paid for the project on their own. Without further communication on the status of available grant

monies or their priority in the order of existing fuel mitigation projects, property owners were left to speculate:

I went ahead and did the work I intended to do because I felt it was necessary to get it done. And then two years later, they called and asked if I was interested in grant money and I was like – “Well you’re a day late and a dollar short buddy, it’s already done.” So I don’t know how they decide what they are going to do. I mean I went through all their hoops, so?

The lack of information disclosed about the grant process left one couple with a particularly negative experience. They learned after completion of the fuel mitigation project that the grant money was regarded as income for Montana state taxes. The financial obligation of meeting the grant cost share and income tax, within the same year, was an unexpected financial burden:

The thing that I was really upset about [is] that they [State of Montana] counted the grant as income on our income taxes. I have never heard of a grant being taxed. He [the contractor] had already done the work. I get this thing for a W-2 to fill in and so I sent it back because I figure there is not much we can do. But we probably would have waited... You’re paying your part of the grant and the same year you get hit with income tax. I think they should tell people that. It hurt us... It definitely want not planned for.

The merchantable timber taken from their land offset some expenses but the unexpected taxation financially impacted the family, “They did take many big trees out. They did enough that it off set it quite a bit but then getting hit with the 20%-25% tax on the rest of it was a real bummer.”

Rigid constraints to fuel mitigation with grant assistance

As mentioned in the introduction a few property owners regarded the hazard fuel mitigation standards, which were tied with grant assistance, as incompatible with their ideas for managing private property. These individuals decided implement fuel mitigation according to their preferences. One permanent resident admitted she and her

husband were “reluctant” to remove the amount vegetation required to receive grant assistance:

When we first moved on the property, it was clear it needed to be thinned because there were millions of tiny little trees right up to the house. We began to hear about grants that were available but every time someone came out we felt uncomfortable how much they wanted us to cut. So we thought we would do it ourselves and we did fine.

Other property owners had concerns with mitigation effects on other ecological factors. Invasive weeds were a concern for one permanent resident. She thought the same mitigation prescription applied to all geographical aspects - that is the direction a slope faces - was inappropriate: “I’m just paranoid about weeds. I will not cut other than a west, southwest slope. I am very conscious of shade level and if you take too much then the weeds come right in.”

Another property owner thought the standard of removing “ladder fuels” was applied too ubiquitously. A ladder fuel being a firefighting term for both the live and dead vegetation, which could allow a wildland fire to transition from the forest floor into the canopy of mature trees. Common ladder fuels included tall grasses, shrubs, tree branches, plus seedling and sapling sized trees. In her estimation the current fuel mitigation work, with emphasis on minimizing ladder fuels, did not leave enough sapling and seedling sized trees. These sapling and seedling sized trees - “regeneration” - were also readily consumed by the local deer population. Between fuel mitigation and deer browse, little regeneration remained to become mature trees, “actually I think we have trouble with regeneration because the deer eat *everything* that is small. If you really want to have any forest management, you have to allow for *some* regeneration.”

The grant assistance included specifications on how a contractor had contended with fuels generated from a mitigation project. These specifications were occasionally in

opposition to the desires of property owners. One grant recipient wanted to utilize the remaining non-merchantable timber as firewood but could not due to contractor requirements to pile and burn the residual biomass. In her estimations, a lot of good firewood could have been utilized:

The only complaint I have with the process is that I told him to leave anything he couldn't sell for me to use as firewood. He told me he was required... He only left me a couple of trees and I watched a huge slash pile burn for three weeks. I just thought, "what a waste." If I had to do it over again, I would have had friends come and help rather than go through the grant, because I thought it was just a *huge* waste.

Contractors

The timber contractors used to complete a fuel mitigation project were a subject of discussion among several property owners. Individuals seemed to have either a positive or a very negative experience with their hired contractor. An important note is that property owners had a choice in hiring the particular contractor they wanted to complete the fuel mitigation work. Even if a property owner was a Western States Grant recipient, the Bitterroot RC&D provided a list of contractors and information on their capabilities. The selection of a particular contractor was at the property owner's discretion. In addition, the fee most contractors charged was based upon the amount of work to be completed multiplied by an hourly labor rate. Any mature trees that were marketable - as lumber, chipped material, or fuel - were subtracted from the total cost of a project. If the marketable timber provided an income in excess of costs, this excess profit belonged to the landowner.

Several property owners mentioned selecting a contractor based upon an existing personal relationship: "I've known him from my church. I was definitely going to have him, if I could. I wanted somebody who knew what he was doing." Others assessed work

completed by a particular contractor and chose according to their aesthetic preferences. One retired couple chose their contractor based upon the thoroughness of the mitigation work he had completed in the area:

That's why we went with him. We had seen his work and knew what he did and when he cleaned up, there was nothing left to clean up. He carefully picked up the small debris, would drag it to the fire, and burn it along with the other debris.

The positive experiences seemed to center on the rapport between the contractor and a property owner. The "success" of a project involved a dialogue between the two parties before work commenced. The time taken for interaction avoided confusion and provided a common understanding for both parties, as noted by one property owner:

He actually marked the trees he wanted to take because they have to be "saleable" on his end too, to make some money. I walked around with him. I was just kind-of curious – 'Why you taking this one and not that one.' He would tell me why. It was really interesting.

Another gentleman purposefully worked with a small-volume timber contractor to implement the hazard fuel mitigation on his property. While touring the property, their ideas for the management of the area were discussed:

I liked their philosophy of being light on the land and not going in and clear-cutting everything or overcutting but [rather] going in and looking at what we wanted to accomplish and finding a way to accomplish those goals.

This interaction also allowed for considerations beyond just thinning trees for fuel mitigation. Other objectives sought by the property owner included the management for the mountain pine beetle damaged lodgepole, the creation of wildlife corridors, snag preservation for bird species, and the retention of down-woody material to control for rainwater run-off on steep slopes.

Contractors were also cited as an informational source for the availability of grant money, “He thought there were grants that were available for clearing because this was going to be a pretty heavy clearing here... He was familiar with the process and was a big help.” Some contractors even assisted property owners with completing necessary but technical portions of the Western States Grant application form, “He came out and told us what kind of trees and he educated us... With his help we got the grant thing filled out.”

In contrast a few property owners had difficulty hiring a contractor to work on their property. They believed the contractors were profit oriented and only interested in hazard fuel mitigation work on lands with significant amounts merchantable timber. One permanent resident wanted to complete mitigation by clearing brush and downed material on her property. She found contractors disinterested:

We really have cleanup work that needs to be done but nobody is interested really in that. They want to make money. So for us to get the underbrush and all that cleaned up... no one seemed to be interested in that. It's the trees...

Even with merchantable timber, one property owner was informed the amount wasn't adequate to make the fuel mitigation work profitable for the contractor. She noted the difficulty in hiring a contractor to undertake work on modest sized property:

Oh yeah, it's really hard to get a logger to come to a small property, really hard. It depends on how much wood is there and if they want to have a full truck load... Multiple, full truck loads or it's not worth them hauling their gear up there.

Unfortunately a few property owners recounted several separated incidents of unscrupulous work done by contractors. One property owner who had purchased a parcel of undeveloped land as an investment recalled being initially contacted by her homeowner association regarding hazard fuel mitigation. She believed only dead mountain pine beetle damaged pine trees were going to be removed from her property.

Upon inspection she realized the contractor was taking dead and live-green trees. The work being done was not aligned with previous negotiations, “the land was being clear-cut. The contractors took more than the dead trees. I stopped the work being done on the property before the contractors finished.”

Owning adjoining lots of undeveloped land, two sisters decided to undertake fuel mitigation work starting around 2004. The contractor was a less than a conscientious or honest individual. He took over 1,500 trees from off her property but didn’t take care of any residual biomass - basically leaving the property a mess and her “high and dry” as she paid for the project up front. A local DNRC forester “helped her out quite a bit” in obtaining a Western States Grant to assist with the clean up. Even with the grant assistance, she did paid substantial pocket expenses to complete the fuel mitigation project. Although she was awarded a \$7,000 settlement, the contractor left the area. A lien was placed on the contractor’s private property.

Even property owners, who had engaged in comprehensive discussions with contractors before mitigation work commenced, still encountered undesirable circumstances. Deciding to complete hazard fuel mitigation work as “neighborhood project” two permanent resident hired the same contractor to complete mitigation work on their properties. For one resident, the contractor disregarded previous negotiated terms specifying the work to be accomplished. She recounted the events:

So the guy that was managing his [neighbor’s] cut offered to do mine too but then after the agreements were signed and everything – all of a sudden, the logger decided it wasn’t worth his time to cut on my property unless he got more trees. I wasn’t present. I was gone. They weren’t supposed to deck the entire job on my property nor were they supposed to burn on my property. They did both. And so when I came back, I was pretty *pissed*... So the person that managed it was not managing it for me. I probably won’t ever trust anybody else with a logging project.

Property owners had a wide range of experience with the various contractors hired to complete the labor portion of fuel mitigation work. Some property owners offered praise while other recounted a difficult and trying experience. Even those individuals who had unsavory outcome recognized not every contractor was unscrupulous, “I don’t think all the loggers are that business oriented. Some of them are conscious and careful. They have done some great stewardship contractors around. So I think it is quite mixed that way.” The reputation of contractors and contracted work does have repercussions to the future of fire prevention in Seeley Lake, as property owners to this study cited friends and neighbors as sources of information on hazard fuel mitigation. Some individuals may be reluctant to undertake the fuel mitigation base upon the experiences and knowledge provided of their trusted acquaintances.

IMPLICATIONS OF HAZARD FUEL MITIGATION

The following section examines unanticipated results of hazard fuel mitigation cited by property owners. Alterations to the forested landscape of private land had either unexpected positive benefits or negative outcomes.

Enhanced aesthetics

The satisfaction and enjoyment of a property’s appearance after the implementation of fuel mitigation was an unforeseen benefit cited by several property owners. One permanent resident admitted to undertaking fuel mitigation for a host of reasons but was particularly surprised at the resulting look to his property:

It’s much prettier. It turned out to be much more aesthetically pleasing than I expected. I just figured I would clean it up and that would be the end of it. I’ve got wildflowers now that have come up. It’s just a lot prettier than I expected.

One property confessed some reluctance in undertaking fuel mitigation, fearing the resulting look would alter the forested landscape she and her husband had purposefully chosen for their retirement location. She initially believed the post mitigation appearance would be an unattractive, barren landscape:

Yeah know that was my thinking – “You’re just going to clear-cut everything and we’re going to look like parts of Kansas here.” I can appreciate that because I used to be that way... When I saw he [the contractor] had all kinds of trees tagged, I thought – “Oh my god there is not going to be anything left.” He took them down and you know the old saying – “You could see the forest through the trees.” I said – “Yeah know this really looks kind of nice.” It looks nicer. It’s greener.

As a full time resident in Spokane, Washington, another individual commenced fuel mitigation to provide protection of her undeveloped land, which she thought might be resold or developed as seasonal residence. She admitted the outcome of was a gamble as she “could not be there for every little detail” of project. She was however surprised and smitten with the results, “[I’m] just tickled with the way it looks. It looks idealic [sic], like a Monte Dolack painting... The one like the backside of Mt. Sentinel. That’s what it reminded me of.”

Aesthetics and the mountain pine beetle

As previously mentioned, property owners cited dealing with mountain pine beetle damage to pine trees as a reason for undertaking fuel mitigation. One aspect to the beetle damage was an “unsightly amount of dead trees.” The tree stands of red needled and gray dead pines were considered ugly - “blight on the viewscape” - as referenced by one permanent resident. As a volunteer on his homeowner association fire prevention group, one resident recalled numerous property owners seeking grant money and educational assistance to mitigate for the beetle damage on their land. He succinctly

noted: “The bugs today are probably our biggest incentive because basically people are just looking at a bunch of dead trees.”

The location of land in Seeley Lake was often tied to the appearance of private property following a fuel mitigation project. Private lands located at lower elevations in the valley were dominated by lodgepole pine. In areas that had been heavily damaged by the mountain pine beetle, the vast majority mature pine trees were often removed as part of fuel mitigation. The downside of fuel mitigation on heavily beetle-damaged lands is that work often left some properties nearly treeless. The austere appearance was unwelcome but unavoidable circumstance, as noted one couple, “Oh yeah we loved it. I mean our trees were the big ones, the 18-inch diameter stuff. It was so nice. It was cool here in the summer and felt pretty cozy in the winter.”

Property located at higher elevation afforded a diversity of trees species that included more than lodgepole and ponderosa pine. Individuals owning property in these “mixed conifer” locations were often disturbed at the post mitigation appearance to lower elevation lands. Having intentionally not implemented fuel mitigation, one couple was unimpressed with work being done.

We are really pretty appalled at some of the thinning that is going on, especially down lower. There are people who are pretty much taking everything. It's their business but I think it is pretty extreme.

Even property owners who were in support fuel mitigation had apprehension at the severity of the work. One permanent resident voiced her concern at what appeared to be the reckless taking of trees. Similar to other property owners who did not reside in heavily infested areas, she was unaware of the severity of the beetle damage and limited

management options for some landowners. Her explanation for the clear cutting settled on timber contractors taking advantage of the intent to hazard fuel mitigation:

Oh, some loggers are getting pretty severe on the land. To me there are two differences – there is proper mitigation and then there is land rape. There are places I never knew there was a house and now they are just stark naked. I just go – “Huh?” There could not have been that many infected pine to make there not one stick on that property, except one by the door. One tree? What happened? So somebody has to... There has to be some better guidelines or something.

In areas of heavy pine beetle damage the appearance of post-mitigation properties had implications for the reception to this fire prevention effort by other property owners. “That’s creating a problem for those that haven’t made that decision yet. I think that is another stumbling block,” was sentiment noted by a member of a homeowner organization. The individual was involved with fire prevention outreach efforts to residents within her homeowner association.

Increase and decrease in property values

An increase in property values was a benefit stated by only one property owner. Located in mixed conifer forested landscape at the top of a ridge, one permanent resident noted the fuel mitigation work he and his neighbor had done improved their views of the Swan and Mission Mountain Ranges. In his estimation, these enhanced views equated to an increase in property values:

When we moved here you could tell there was a nice view but you had to walk around outside. So thinning my property improved the view a whole bunch. The guy that owns the section right here, thinned his [property] this year and probably added \$40,000 dollars to my land value because it just opened that view up. Next year the Forest Service is going to thin which should again just open up the scenery significantly.

Only one permanent resident spoke to hazard fuel mitigation as possibly decreasing the value of her family’s property. The fuel mitigation work was located in a

residential area with the landscaping that was heavy to pine trees. The majority of trees that once afforded the assets of privacy and serenity were removed to deal with mountain pine beetle impacts. She commented on her inevitable situation, “I didn’t want to cut the trees out but, then they got sick... They got sick in a hurry. Yeah know, I just didn’t want to cut my trees out because I wanted to sell my house.” Depending upon location within the urban interface, hazard fuel mitigation was thought to enhance or to detract from the attractiveness and subsequent value of private property.

Loss of privacy

Among property owners that implement fuel mitigation work, the loss of privacy was cited undesirable outcome. Many property owners mentioned purchasing land or residing in Seeley Lake for the aesthetics and seclusion the forested landscape afforded.

One retired couple noted the adverse result of fuel mitigation work:

The privacy view from our land... We have had to take out the trees between us and our neighbors that we would have preferred to keep. So that part was probably unexpected, to lose all the trees in the front of your house. I think that is a negative, not to have that privacy.

In areas heavily damaged by the mountain pine beetle, the loss of mature timber nearly eliminated any visual barrier between neighboring properties. One individual commented the result of fuel mitigation completed by her neighbor:

This lot over here was just cleared out this summer. He just *cleared*. I didn’t realize it was that bad but I guess all the trees he took were dead and dying. So I’m kind of bummed out that was a nice buffer between for us for the road.

Property location within the urban interface when coupled with fuel mitigation tended to impact smaller lots and more residentially developed areas. With their home located in a heavily developed homeowner organization one retired couple noticed an increase noise and activity from their neighbors after completing mitigation work:

The golf course comes through a lot clearer to us – the noise from the golf course... The houses on the hill over here, we couldn't see them before. We knew they were there. We could hear the yelling and screaming but now we can actually see it. But I like the privacy. I like what I felt was the privacy we had.

Watershed considerations

A few permanent residents observed changes to local streams after the completion of fuel mitigation on their land and on neighboring properties. One long-time resident believed mitigation work had caused an increase in rainwater run-off during the spring season. The more open lands also evaporated moisture, which should have be part of stream flows in drier summer months. Assessing the flow of the nearby creek, he stated, “It doesn't maintain a real steady flow and there were times this year when it sounded like it was louder than it has ever been. And other times you can't tell it is there, you can't hear it.” Another retired couple noticed the flow of a main stream through the valley had become more prominent after several years of fuel mitigation work, “Morel Creek, if it's rained hard, it used to rise but nothing like it does now... Because up above they have mitigated too and the water just pours down.” The husband had apprehension about the repercussion fuel mitigation could eventually have on the private wells. These wells served as the only source of domestic water for many residents:

One of the things that concerns me is I think we have lost some watershed and that bothers me because everybody up here is on wells. I keep just feeling uneasy with the fact that we have a good well but wants the impact? How much have we lost? I don't know but I feel we have lost a lot of water retention.

Human health impacts

The “health impacts” are from the wood smoke generated during disposal of residual biomass, the non-merchantable timber, generated from fuel mitigation. One gentleman, a retired employee with federal government, wished more could be done to

utilize the non-merchantable timber produced with hazard fuel mitigation. The current solution to slash pile and burn residual materials generated wood smoke that was irritated pre-existing respiratory conditions:

Right now it is not cost effective but, oh boy there's all kind of stuff up here that could be chipped and hauled and it would eliminate the smoke in the air. It's tough... I've got asthma and that smoke gets so heavy I can't do anything. I go outside and my lungs just burn. My bronchiole tubes, it's just like I'm on fire. So if it could be used for bio-fuel why it would be big help to a lot of people health wise.

Hazard fuel mitigation had unexpected outcomes that were viewed positively or negatively by property owners. The amount of mountain pine beetle damage to an area often dictated the degree of fuels work that had to be implemented on private land. In more residential areas, lot size and structure density when coupled with the amount of mitigation left some property owners with a substantial loss of privacy and a severe "clear-cut" appearance. The unsavory post-mitigation appearance to heavily beetle damaged properties creates misconceptions that maybe difficult for private and professional individuals involved with fire prevention outreach. As mentioned previously, even property owners who supported fuel mitigation and had completed work on their own land were left to speculate upon the necessity of such severe mitigation work.

Financially, dealing with the damages from the mountain pine beetle posed a challenge for professionals involved with the administrations of the Western States Grant Program. The expense of fuel mitigation work in beetle damages areas stretched limited annual budgets. Little infrastructure or private markets existed to use biomass or beetle damaged timber.

Table 5.1: Analysis

Implemented Fuel Mitigation

Did Not Implemented Fuel Mitigation

Categories: stated reasons	Permanent Residents 15 total	Seasonal Residents 8 total	Undeveloped Landowner 7 total	Permanent Resident 6 total	Seasonal Residents 3 total	Undeveloped Landowner 3 total
Experience wildland fire as a motivator	3, 4, 11, 12, 13, 18, 19, 25, 35, 36	7, 14, 15, 30, 34 37, 41	5, 8, 20	2, 23		10
Contact with friend, neighbor, professional	3, 4, 11, 12, 18, 29, 27, 33, 36	15, 30, 37, 41	6, 8	2, 38	24, 39	
Outreach: contact from homeowner association			5, 7, 8, 20, 21			10, 40
Print material: HFM & defensible space	11, 36	7, 16, 34	5, 21, 42			9
Self-inquiry: internet or formal class	12, 36		42			9
Work: natural resource mgt. Field or VFD	25, 27, 28, 29, 35	16, 14, 34	42	31, 32		
Grant money assistance	3, 4, 11, 12, 13, 18, 25, 27, 33	7, 14, 16, 34, 37	5, 6, 7, 8, 20, 21			
HFM: keeps fires manageable	3, 11, 12, 13, 18, 25, 27, 29	7, 37	5, 8			
HFM: reduce impact from large fires	3, 11, 18, 19, 25	14, 30	20, 21			
Protection of personal investment	3, 4, 13, 18, 19, 25, 29, 35, 36	7, 14, 15, 34, 41	5, 7, 20, 21			
Personal responsibility	3, 4, 11, 12, 13, 18, 25, 29, 35, 36	14, 15, 30	20	2, 23		
Good neighbor	3, 12, 18, 19, 27, 35	16	5, 6, 7	2		10
Stewardship: healthy forests	3, 4, 12, 18, 19, 28, 35	14, 34, 37	5, 42	2		10, 40
Mountain pine beetle issues	3, 13, 18, 26, 29, 33, 36	7, 14, 15, 41	5, 8, 42	1, 2		9
Improve aesthetics to property	3, 4, 12, 13, 18, 29, 33		5, 8, 21, 42	2		

Table5.1: Analysis**Implemented Fuel Mitigation****Did Not Implemented Fuel Mitigation**

Categories: stated reasons	Permanent Resident 15 total	Seasonal Resident 8 total	Undeveloped Landowner 7 total	Permanent Resident 6 total	Seasonal Resident 3 total	Undeveloped Landowner 3 total
Capacity to deal with loss: including fire insurance				1, 31, 32	24, 39	
Not buying into fear factor during a WUI fire				31, 32	39	
Futility to HFM: location of home + topography, wx, & fuels				31, 32	22, 39	
HFM actually increases fire danger	28		42	1, 38	22	
Personal Responsibility: Reconcile WUI fire	28		42	1, 31, 32, 38	22, 39	
Time constraints				2, 38		
Expense/costs to HFM				1, 2, 23	24	9,10, 40
Applied but did not receive grant						10, 40
Grant change from 75-25 to 50-50 cost share						9
Physical capacity to do HFM	3, 13	37		1, 38		
Rigid standard to HFM with grant assistance	12, 28		42	38		
Problems with contractor	28		5	38		
Aesthetics – don't want to change appearance				1, 31, 38	22, 24, 39	
Not inclined to HFM w/ loss of privacy				1, 31, 32	22	

- The table contains the reasons and justifications stated by property owners for implementing or not implement hazard fuel mitigation.

- The numbers were randomly assigned to each property owner and done intentionally to help assess any patterns from the data.

CHAPTER VI

CONCLUSION

The chapter opens with acknowledging the intentions and limitations to this research and synopsis of the finding in “Purpose and Limitations to Research.” The section “Discussion and Relations to Past Research” explores past social science research on wildfire and the wildland urban interface. Highlights are the common and unique findings from this study of wildland urban interface property owners in Seeley Lake, Montana. The section “Seeley Lake, Montana” recapitulates the findings property owner’s views and actions of in regard to hazard fuel mitigation in the WUI community of Seeley Lake, Montana. The chapter concludes with two straightforward sections “Recommendations to Mangers” and “Future Research.”

PURPOSE AND LIMITATION TO RESEARCH

The research for this project endeavored to capture the views and behaviors of wildland urban interface property owners in regard to wildland fire prevention activities. Previous social science research of WUI residents by Brenkert-Smith et al. (2006) noted the absence of perspectives from property owners who had not implemented fire prevent activities. The work of Bright and Burtz (2006) looked to discern the different views and behaviors among permanent and seasonal WUI residents. Weisshaupt et al. (2007) explored the different perspectives on wildfire risk and responsibility between both urban and rural property owners. Seemingly absent from previous research were the perspectives of undeveloped landowners, permanent residents, and seasonal residents within the same WUI community who had chosen to undertake, or not, wildland fire prevention activities.

Through purposive sampling, interviews were obtained from two groups of property owners - those who implemented fuel mitigation and those who chose not to implement hazard fuel mitigation on their property. Within these two group, three types of property owners - permanent residents, seasonal resident, and owners of undeveloped land were interviewed for this project. Semi-structure in-depth interviews were conducted with 42 property owners in the forest proximate community of Seeley Lake, Montana. Using an interpretive approach and ground theory methodology, the content analyses of transcribed interviews was completed for the purpose of capturing the variations in WUI property owner behaviors and viewpoints.

The use of in-depth interviews allowed for gathering nuanced perspectives and detailed information from a small group of participants in one WUI community. Due to the small number of interviews, no statistical inferences can be accurately deduced from this work. In addition, there are limits to the analytical generalizations that can be created from this research. The local contextual factors including demographics, regional economies, and socio-cultural heritage, influence both individual and community regard for wildland fire and risk mitigation. However, the insights from this research should help encourage further discussion and prevention planning in areas designated as the wildland urban interface.

Evolving WUI property owner knowledge on wildfire prevention

The research of Gardner et al. (1987) examined the wildland urban interface as a complex environment. Along with the work of Cortner et al. (1990), researchers suggested property owners did not have a well-developed understanding of the complex physical environment to the wildland urban interface. Residents lacked a thorough

comprehension of the wildfire prevention efforts advocated by local, state, and federal fire managers. During the past 15 years, with the prevalence of large and destructive wildland fire across the U.S, research by Paveglio, Carroll, Absher, and Robinson (2011), Bright et al. (2007), Jakes et al. (2007), Weisshaupt et al. (2007), and Bright and Burtz (2006) has shown increasing awareness and knowledge among WUI residents. Research participants in these studies were knowledgeable about wildland fire, current forest conditions, and the need for fire prevention efforts, including defensible space and hazard fuel mitigation.

The property owners in Seeley Lake were likewise aware of the wildland fire history in the Swan and Clearwater Valleys. Many of the seasonal and permanent residents were residing in area during several large wildland fires, including the 2007 Jocko Lakes Fire, which caused the evacuation to over half of the Seeley Lake community. Individuals in this study were familiar with aspects of wildland fire suppression and the issues surrounding prevention practices. The property owners who implemented mitigation work believed these fuels treatment allowed fire-fighting resources the capacity to contain small fires and provided a measure of protection to personal investments during a significant wildfire event. However, hazard fuel mitigation was often undertaken in order to accomplish more than risk reduction and protection of personal property. Other reasons encompassed wanting to enhance the aesthetic appearance to their land, to deal with the trees hazards mountain pine beetle infestation, and to create a healthy forest.

The property owners who chose not to implement hazard fuel mitigation also provided multiple reasons and nuanced justification for their position. Some property

owners wanted to engage in this activity but stated constraints including the lack of adequate time and the physical ability to undertake this labor-intensive prevention effort. These individuals cited the expense of contracted work as a barrier from engaging in the fuel mitigation. Other property owners did not want to engage in fuel mitigation work. These individuals thought altering the forested landscape would result in a loss of privacy and an undesirable change in the appearance to their property. The analysis Table 5.1 in Chapter V: Findings, details the range of incentives and barriers provided by property owners interviewed for this research.

An encapsulating lesson is that property owners engaged, or did not engage, with hazard fuel mitigation for a host of complex and intertwined incentives and barriers. Property owners provided detailed justifications for their decision-making. For land management agencies and other organizations tasked with community fire planning, having knowledge about the range and diversity of viewpoints and behaviors can allow for more detailed outreach methods and materials on hazard fuel mitigation. For example, outreach efforts that include conversations on healthy forests and enhanced aesthetics may influence prospective property owners into engaging the fuel mitigation.

The knowledge that some property owners are unwilling to undertake hazard fuel mitigation can also assist in community fire protection planning. In the Seeley Lake area without any type of mandatory regulations or financial penalties, property owners had discretion in implementing fire prevention measures. Options for land management agencies and fire prevention organization include initiating and supporting local, state, and regional policies that require specific fire prevention activities from WUI property owners. Another option is to assess community fire protection were compliance to

hazard fuel mitigation from all property owners may or may not be a necessary objective. Fire behavior modeling and risk assessments could target areas within the community where it is critical for property owners to implement hazard fuel mitigation. This more detailed evaluation may allow for leeway property owner participation or may help to bolster arguments for mandatory regulations.

DISCUSSION AND RELATIONSHIPS TO PAST RESEARCH

Healthy forests

Historically, the majority of lightning ignited wildland fires were suppressed as part of land management policy and practices. Prior to fire suppression activities, wildland fire had provided for natural regeneration to the surrounding forested landscape (Pyne, 2001). Existing research has documented concerns among WUI residents regarding the current state of the surrounding forests after years of fire suppression. In research related to assessing public response to large fire incidents, Carroll et al. (2005) and Rodriguez-Mendez et al. (2003) noted that WUI property owners believed their local forests were not in a “healthy” condition due to the reduction in commercial logging practices and the suppression of many naturally occurring wildland fires. In their view, these practices left surrounding landscape densely forested and susceptible to devastating wildfires. In Bright et al. (2007) the condition of the forest was cited as a critical factor determining citizen support of public land management actions, which included prescribed fire and mechanical thinning on state and federal properties.

Many Seeley Lake property owners mentioned past fire suppression practices that they assumed had led to unnatural and unhealthy accumulations of vegetation to the surrounding landscape. In addition, the residents of several homeowner associations

(HOA) thought years of strict enforcement to HOA covenants, which forbid the thinning of trees and vegetation, had caused the unhealthy forest conditions on their property. These covenants were blamed for the dense, decadent, and beetle infested forest conditions. With the implementation of mitigation work, property owners believed they were being good stewards and properly managing their land. Thinning the existing vegetation provided for fire prevention and allowed the remaining trees a chance to flourish with less competition for water, sunlight, and space.

In addition to healthy forests, Seeley Lake property owners cited improving the appearance of their property as an incentive for implementing fuel mitigation. The research of Daniel, Weidemann, and Hines (2003) found individuals are willing to accept fuel reduction treatments when these provide wildfire hazard protection and added aesthetic value to the surrounding wildland urban interface. In the Clearwater Valley surrounding Seeley Lake, the impacts from a multiple-year infestation of the mountain pine beetle had resulted in red-needled and gray, dead pine trees. Property owners believed that the elimination of these trees would significantly enhance the appearance of their property.

Unfortunately in areas dominated lodgepole and ponderosa trees, the fuel mitigation work was substantial. Some property had to remove the majority of trees, resulting in little remaining overstory to the once densely forested landscape. The loss of so many trees was an unwelcome circumstance for these property owners. In addition, individuals who resided in more mixed conifer locations failed to comprehend the extent of the beetle damage in these pine-dominated sites. Some owners speculated that such extreme fuel mitigation work was actually a guise for commercial logging operations,

where property owners and timber contractors could profit from the thinning of merchantable timber.

The individuals involved with local fire prevention outreach indicated concern about the implications of tending to beetle damaged areas. They worried the appearance of post mitigation properties might deter prospective property owners from considering hazard fuel mitigation. The barren, clear-cut look to many pine-beetle treated properties might be regarded as indicative of the typical post-mitigation appearance. These prospective property owners might choose to decline fuel mitigation in order to preserve the existing forested landscape to their property.

Ethics of personal responsibility and the good neighbor conduct

In addition to stewardship, individuals to this study cited personal responsibility and “good neighbor conduct” as necessary standards required of WUI property owners. These sentiments have been touched upon in previous research. The work Weisshaupt et al. (2007) found property owners to believe that land management agencies were responsible for reducing the fire danger on the forestlands under their control but these agencies did not “owe” safety to property owners in the wildland urban interface. These research participants felt the responsibility and financial obligations for mitigating wildland fire risk should be placed upon the WUI residents.

In Paveglio et al. (2011) residents felt it was nearly impossible to eliminate fire danger in the WUI. Parroting the same phrase used by property owners in Seeley Lake, participants indicated fire was not “a matter of if, just a matter of when.” Landowners had a responsibility to reduce the fire danger on their lands and not add to the potential danger of fire in the WUI by abstaining from fuel mitigation treatments. These

sentiments are in line with the good neighbor ethic stated by Seeley Lake property owners. In the event of a wildland fire, the lack of fuel mitigation on private property could hamper confinement and containment efforts of fire fighting resources and allow fire to possibly impact other public and private lands. By undertaking hazard fuel mitigation, property owners were intentionally seeking to provide for their protections and for the safety of their fellow residents.

Flip-side: Property owners who choose not implement HFM

One of the goals of this research was to capture the under-represented group of WUI property owners, those who chose not to implement fuel mitigation. A few studies (Bright et al., 2007; Bright & Burtz, 2006) attempted to broach the topic through mail surveys using questionnaires and examining the findings through the use behavioral theories. Other social scientists (Daniel, 2007; McCaffrey & Kumagai, 2007) formed generalizations on property owner behavior based upon risk-perception research by psychologists including Fischhoff et al. (2004) and Slovic et al. (2004a).

In examining the findings from Seeley Lake, property owners who abstained from fuel mitigation could be separated into two different categories. In the one category were the property owners who wanted to undertake risk reduction activities but specific constraints, including the physical ability, sufficient time, and adequate financial resources, prevented participation. The other category encompassed property owners, who were equally educated and knowledgeable about wildland fire but had intentionally chosen not to undertake fuel mitigation work. These individuals referenced several disincentives, such as, the loss of privacy and aversion to the post-mitigation park-like appearance. The justifications provided by both categories of property owners seem to

initially confirm the work Fischhoff et al. (2004) where in people were found to be less willing to undertake risk reduction activities if costs were high in financial resources, personal efforts or if the activities caused undesirable alterations to other attributes or values. But this was only part of the story.

The property owner who intentionally chose not to undertake fuel mitigation cited the ethic of personal responsibility that was atypical. In their opinion, owning property in the WUI of Seeley Lake required individuals to reconcile with the possibility of loss from a wildfire. The occurrence of large-scale wildland fires was part of a natural cycle that provided regeneration to the forested ecosystem. These property owners believed fuel mitigation practices altered vegetative conditions with no guarantee of actual protection from a wildland fire. In some areas, hazard fuel mitigation seemed to be counter-productive endeavor. The removal of timber replaced the once cool, shady environments with more open, hotter, and drier conditions. Existing vegetation was easily desiccated and readily available as fuel in the event of a wildland fire. These property owners had strong opinions and justification for not implementing hazard fuel mitigation. Outside of county zoning ordinances, mandatory state regulations, or probative insurance premiums, little would probably dissuade these property owners from their current stance toward fuel mitigation.

Finances and hazard fuel mitigation

The research of Brenkert-Smith et al. (2006) found WUI property owners to engage in low-cost and low-effort risk reduction actions, such as, moving a woodpile away from structures, raking pine needles, and mowing the grass. More extensive fuel treatments were viewed as substantial undertakings. Part of the decision making process

was an assessment of personal financial resources. In Seeley Lake many property owners who had undertaken fuel mitigation admitted the work could not have been accomplished without grant assistance. The monetary cost to fuel mitigation was the primary justification for forgoing prevention work by half of the property owners, who did not undertake mitigation treatments.

The cost of contracted fuel mitigation in Seeley Lake is substantial because the work required the felling of mature timber plus the piling and burning of residual biomass. A Bitter Root RC&D forester provided a summary of statistics in their administration of the Western States Grant Program from 2001 to 2010. In Missoula County, the average cost to thin, prune and treat slash was \$1,354.00 per acre. Depending on access, slope, density, power-lines, and structures in the vicinity, the cost per acre ranged from \$400.00 to over \$2,000 an acre. The median size of a project was seven acres with a range of less than one acre to 150 acres. The summary noted the cost of treatment in Missoula County was expensive and the current depressed timber market did not offset the costs to a fuel mitigation project. The lack of local infrastructure to use the residual biomass required these materials to be treated on site. The time required to slash-pile and to then burn these residual materials added to the labor costs of hazard fuel mitigation.

The expense of fuel mitigation was beyond the financial capacity of some individuals even with the even a 50% - 50% cost share between a property owner and the Western States Grant assistance. The Bitter Root RC&D forester assigned to the Seeley Lake area spoke to the financial situation of grant funding. No mechanism or process

existed to assess the financial assets and therefore capacity of a property owner to pay for fuel mitigation.

In addition, with more applicants than funding, the Seeley Lake area had a waiting list for grant assistance. In a given year this area had approximately \$250,000 in requests and only \$60,000 to \$150,000 in grant money. The insufficient funding had necessitated the Bitter Root RC&D and Montana DNRC foresters to undertake field assessments in order to prioritize projects. Even with lands located in the high priority treatment areas of the Seeley-Swan Fire Plan, some applicants were deferred from receiving grant funding. Most grant applicants had at least a one-year time lag between applying and being awarded a grant. At the time of this research several property owners had been on a waiting list for over four years.

Finance assistance and community fire protection

Paveglio et al. (2009) examined how the social diversity of two different WUI communities influenced their approach to community fire prevention. The formal organizations, socioeconomic characteristics, and patterns of social interaction within each community, dictated different approaches to wildfire protection planning. As an example, the financial resources of the one community, a gated HOA, allowed the board of directors to hire professional contractors. These contractors developed the community wildfire protection plan (CWPP) for the HOA. In contrast, the other community had no formal organizational structure. By holding picnics and Friday “burger nights,” a few concerned residents helped to build local interest that eventually led to the creation of more formal fire prevention planning.

The recommendation from Paveglio et al. (2009) was for fire management and prevention specialist to systematically document the actual needs and existing capacity of WUI communities. The end result would be the selective targeting and distribution of scarce resource to the communities most in need of financial and educational assistance. With regard to the study of individual property owners in Seeley Lake, Montana, I would argue for the same approach to fire prevention among individual property owners. The best use of limited financial resources - grant assistance based up need versus accessibility - would actually lead to the implementation of more fuel mitigation work and would provide for greater community fire protection. The “Recommendations to Mangers” section of this chapter examines possible changes to the grant funding structure.

SEELEY LAKE, MONTANA

The property owners to Seeley Lake, Montana provided diverse reasons and nuanced justifications for their position on fuel mitigation. Hazard fuel mitigation was often undertaken for incentives outside of risk reduction and the protection of property from a future wildland fire. Two incentives were enhancing the aesthetic appearance and dealing with general hazards from a mountain pine beetle infestation. Property owners spoke to values that included taking personal responsibility, acting as a good neighbor, and being a steward to their land. The stewardship ethic required property owners to actively manage their property in order to provide fire protection and to achieve a healthy forest.

In comparison, the property owners who did not implement hazard fuel mitigation can be divided into two categories. There were individuals who wanted to undertake

mitigation on their land but other constraints - physical ability, time, and costs - prohibited participating in this activity. In contrast, the other category of property owners did not want to engage in this activity. These individuals believed altering the existing vegetation provided little protection in the event of a large, severe wildland fire. They stated other means to cover potential losses including fire insurance and the ability to rebuild a residence. Several property owners cited circumstances where the removal of vegetation seemed to add to the existing fire danger. Vegetation that was once shaded by a mature timber canopy was now open to more sunlight and wind. This new environment allowed brush and grass to be easily dried out and more readily available as fuel in the event of a wildfire. Hazard fuel mitigation seemed to be a counter productive approach to mitigating fire danger.

Additionally, these individuals thought fuel mitigation would undesirably alter the forested landscape of their property. The change in aesthetic appearance and loss of privacy were noted disincentives. Several property owners employed value laden language to justify their stance for not undertaking this fire prevention activity. In an atypical version of personal responsibility these non-implementers felt other WUI property owners needed to reconcile the decision to own land in an area where wildfire was a natural and necessary process for forest regeneration.

Also captured in this research were the positive benefits and negative outcomes of hazard fuel as stated by property owners who had implemented treatments. The benefits included satisfaction and enjoyment of the property's appearance post mitigation. In certain locations the thinning from mitigation work had created views of the surrounding mountain landscape and was believed to have added monetary value to a property. In

contrast, properties located in areas heavily infested with the mountain pine beetle, fuel mitigation required the removal to the majority of mature timber. The outcome of the work resulted in a loss of privacy and vastly changed the appearance to a property. This change from a forested to a nearly treeless landscape was thought to possibly result in a negative impact to real estate values.

In the process of fuel mitigation several property owners mentioned bureaucratic hassles with the Western States Grant program. A few found the type of information requested in the grant applicant to be outside their familiarity. Individuals mentioned some frustration with a lack of correspondence in regards to their status as a grant recipient. Others were uninformed the grant was taxable state income. The financial burden of meeting both the cost-share to the grant program and an additional state tax in the same year was a hardship. Regrettably, a few property owners mentioned unsavory experiences with timber contractors hired to complete fuel mitigation. In isolated incidents, several contractors did not adhere to the pre-arranged agreements with property owners.

A few residents had concern with the health impacts from the smoke generated during the treatment of residual biomass that resulted from thinning of brush and trees. Seeley Lake and the surround area of Missoula County had little infrastructure to utilize this residual biomass. These materials had to be slash-piled and burned as part of the mitigation work. In addition, to health concerns, property owners had apprehension about the impact of widespread implementation of hazard fuel mitigation to the area. One area of concern was the watershed. The removal of vegetation by many property

owners throughout the Seeley Lake area had implications, including the future capacity of residential wells.

RECOMMENDATIONS TO MANAGERS

Outreach Pathways

The property owners to Seeley Lake, Montana cited learning about fuel mitigation from various sources. Some individuals conducted their own research through reading print materials and Internet searches. Others cited contact with friends, neighbors, professional foresters, and timber contractors as information sources. These property owners seemed to engage and respond to a range of informational sources. One suggestion is to continue utilizing various media sources to disseminate information concerning fire prevention and hazard fuel mitigation.

In Seeley Lake, homeowner associations (HOA) had a key role in outreach efforts for hazard fuel mitigation. One HOA mailed informational pamphlets and made follow-up phone calls in an attempt to contact property owners. Based on information gathered from this study, several permanent and seasonal residents plus the majority of undeveloped landowners cited contact with their HOA as source of information on fuel mitigation. These individuals were made aware of particular issues, including the potential fire danger, the mountain pine beetle infestation, and the availability of grant funds. From my research, I found two homeowner organizations, which had established a relationship with the Seeley Lake Hazard Fuels Taskforce. These relationships helped to educate a core group of property owner who subsequently functioned as outreach specialists on fuel mitigation and grant assistance. These HOA members disseminated

prevention information to a broader audience than would have been possible with the current structure to the Seeley Lake Hazard Fuels Taskforce.

The Seeley Lake Hazard Fuels Taskforce is a non-profit organization whose members work collaboratively on community fire protection for the Swan and Clearwater Valleys. The members are the rural fire departments, professional land management agencies, and a few non-profit organizations all located in the two valleys. Through grant assistance, the Seeley Lake Rural Fire is appropriated funds that can be used for fire prevention education. A proposal is to continue fostering the established relationships and focus on outreach efforts to the seven other homeowner associations in the Seeley Lake area. The education of a few key individuals, such as the HOA board of directors, on aspects of hazard fuel mitigation and grant assistance would further disseminate information on the need for fire prevention activities by property owners in the wildland urban interface.

Outreach concerning healthy forests

Property owners to Seeley Lake cited the concepts of stewardship and healthy forest in their discussions of hazard fuel mitigation. They expressed interest in creating a healthy forest on their land. Missoula County publishes a comprehensive booklet - the "Good Neighbor Handbook: Information for Rural Landowners in Missoula County." The guide provides information on issues, such as, native vegetation and invasive weeds, avoiding wildlife conflicts, and the need for homeowners to engage in fire prevention efforts. The only "forest health" issue given consideration surrounded learning to recognize the early signs of mountain pine beetle infested trees. A suggestion is to incorporate healthy forest language and images in fire prevention materials. The

Missoula County pamphlet and other similar outreach literature could specifically address forest health issues and concepts. The incorporation of property owner stories, quotes, and images could emphasize achieving both fire prevention and healthy forests. This literature may appeal and engage a broader audience of WUI property owners.

Also tied to the issues of fire prevention outreach and healthy forests was mitigation work to address the impacts of the mountain pine beetle infestation. Property owners had several reasons for removing their trees. The dry, standing red needle trees could be more easily consumed in a wildland fire and the dead trees would eventually fall over and accumulated as surface fuels. The trees were also a general hazard, as the dead and shallow rooted pines could easily blow-over onto homes, vehicles, and power lines. In addition, many property owners considered the red needled and gray dead trees as unsightly.

In areas dominated with pine trees, the beetle had infested the vast majority of mature timber. The post-mitigation appearance was often stark, with few remaining trees. Property owner involved with local fire prevention outreach indicated concern about the implications of tending to beetle damaged areas. They worried the appearance to post mitigation properties might deter prospective property owners from considering hazard fuel mitigation. The extraordinary circumstance and extreme thinning need to deal with the mountain pine beetle infestation could be incorporated into hazard fuel mitigation outreach materials and addressed by fire prevention specialists in public forums. Property owners considering fuel mitigation would have knowledge that the mitigation work for the mountain pine beetle was not indicative of more standard treatments that removed more moderate amounts of vegetation.

Grant assistance - distribution of funds based on need

The completion fuel mitigation in the timbered landscape of Seeley Lake was an expensive endeavor. In addition, the type and amount of labor required the majority of property owners to hire a timber contractor. Even with the 50% - 50% cost share from a Western States Grant, a few property owners admitted the cost of mitigation work was beyond their capacity. The Bitter Root RC&D forester tasked with administering the Western States Grant for the Seeley Lake area did not have a process or a procedure in place to assess the financial assets and therefore the ability of property owners pay for contracted fuels work.

One instrument to assess the need and amount assistance could be through the use of federal tax returns. However, changes to the Western States Grant Program would have to occur at a national level. The Bitter Root RC&D and the Seeley Lake Hazard Fuels Taskforce do not have the latitude to alter existing procedures and stipulations to this federal grant program. The argument for assistance based up need versus accessibility would have to gather momentum at the state and regional levels in order to change existing policy. In addition, the argument for assessing and awarding grants based upon need would rest on the premise that more hazard fuels mitigation work would be accomplished by changing the existing program.

In examining the data from Seeley Lake research, property owner viewed the grant assistance as an incentive for implementing fuel mitigation. Presumably, the property owners that could afford the entire cost of mitigation may defer the implementation if no external financial incentive existed. Offering some percentage of grant money at a minimum threshold of 20% - 25% may keep property owners interested

in implementing hazard fuel mitigation. The savings from not providing the standard 50% - 50% cost share could be allocated to other property owners who need the extra financial assistance.

Western State Grant Program & Seeley Lake

Several of the bureaucratic hassles mentioned by Seeley Lake property owners with regard to the Western States Grant Program could be resolved without incurring substantial costs or changes in the present administration by the Bitter Root RC&D Area, Inc. The Bitter Root RC&D website provides a basic introduction to hazard fuels mitigation. In addition, there is a link to a blank *Seeley Lake Hazardous Fuel Treatment Grant Application* form. Providing some supplemental information would assist property owners in completing this application. A guide could be developed that provides instructions and examples of the required information. Another tool might be a sample application with completed information, a simple map, and a few pictures to help orient property owners.

After applying for a grant, property owners could be sent an informational pamphlet outlining the grant process and stipulations. Prospective participants would understand the grants are awarded based upon several criteria, including: an assessment of their property's location in Seeley Lake, the existing fuel conditions on the property, and the availability of grant money. This prioritization of grant assistance would result in minimum of a one-year waiting period, as there is typically more applicants than available grant money. Additional information provided in the pamphlet could outline the specific parameters fuel mitigation work. Property would be required to alter the existing fuel on their property. Requirements would include: the thinning to an average

of 10 feet between crowns of trees, the pruning up to 12 feet or 1/3rd the height of a tree, and the treatment of all residual slash. Also outlined could be financial consideration, with specific mention that the grant is considered income by the state of Montana and subject to taxation of 20% - 25% of the final grant award.

The Bitter Root RC&D forester relays much of this information to initial applicants but people tend to forget or misconstrue facts with time. A hard copy of the grant parameters and the posting of this pamphlet on the Bitter Root RC&D website allows a forum for applicants to reference this information.

FUTURE RESEARCH

Cumulative affects of HFM

Seeley Lake property owners mentioned several bio-physical changes to forest proximate community. Individuals observed changes to annual stream flows and to forest conditions after fuel mitigation became a more common practice among property owners. Fire prevent efforts, including hazard fuel mitigation, are regarded as a necessary responsibility and precaution as a WUI property owner. However, the cumulative impacts and implications of hazard fuel mitigation to the local ecology are unknown. There is a need to research and to assess the best use and location of mitigation practices for the local ecology.

Social science

Part of this research was examining the how WUI property owners in Seeley Lake came to learn about fire prevention issues, specifically hazard fuel mitigation. Research could examine the stimulus and time periods in which WUI property owners become

aware of and engaged in fire prevention efforts. The information would focus the fire prevention outreach efforts of professional managers and volunteers.

A different research project could examine the efficacy of incorporating wildland urban interfaces issue as part of primary and secondary school curriculum in WUI locations. For example science programs could integrate local and regional fire ecology and forest health issues plus provide instruction on fire prevention and necessary mitigation efforts. These future property owners would be knowledgeable on the need to financially plan for and to take personal responsibility as WUI residents.

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Appendix I: Letter to Property Owners

College of Forestry and Conservation
The University of Montana
Missoula, Montana 59812
Phone: (406 -243-5221)

Name
Address 1
Address 2

Hello [*Name of Property Owner*]:

My name is Jennifer Martynuik and I am a graduate student at the University of Montana, College of Forestry and Conservation. For my Master's project, I am researching fire protection measure on private property in Seeley Lake, Montana. I am contacting you because I am hoping to take with private property owners like yourself in order to better understand your approach to fire protection on your property.

I found you name from the Bitterroot Resource Conservation and Development Area, Inc. information on property owners who have been involved with the federally funded "Private Landowner Western States Grant Cost-Share Program." I am writing to see if you would be willing to participate in my research work. If you agree to take part in this project, I am asking to interview you and any other co-property owners at the above address. The interview will cover approximately ten questions and will take around 45 minutes to complete. In participating in this study, you will be assured of complete confidentiality – your name or any other identifying information will not be in any written documents.

Your participation with this study will help to identify trends that may aid community organizations, land management agencies, and public institutions in dealing with wildland fire issues in urban interface communities. Within a week to ten days from today I will be phone calling to request your participation. I realize that your time is valuable and want to stress that the interview will be arranged and conducted according to your schedule and preference. For any questions and inquiries, my office phone, with a voice message service, at the University of Montana is:

(406) 243-6244.

Thank-you for your time and consideration,

Jennifer Martynuik

Appendix II: Interview Guide for Private Property Owners Who Have Implemented Fuel Mitigation

Private Property Owner Regard of Hazard Fuel Mitigation in the Wildland Urban Interface

Interview Guide for Private Property Owners Who Have Implemented Fuel Mitigation

Introduction: Thank you for agreeing to participate in this interview. My name is Jennifer Martynuik and I am a graduate student at the University of Montana, the College of Forestry and Conservation. My current work involves research into wildland urban interface communities such as Seeley Lake, Montana. A specific area of interest is the wildland fire protection measures taken on both public and private property.

This interview is one component of my graduate school research work. General information and/or segment of this interview may eventually become a part of my Master's Thesis.

In participating in this study, you will be assured of complete confidentiality – your name or any other identifying information will not be included in any written documents.

If it is Okay with you, I would like to digitally record this interview. This recording ensures that your views are accurately noted and it allows me to focus on what you are saying.

If would first please sign the “Subject Information and Informed Consent” document required by the University of Montana’s Institutional Review Board.

- The research data and this consent form will be stored in a locked file cabinet.
- Digitally recorded information will be transcribed without any information that could identify you. The digital recording and the transcription will be securely kept.

I. History in the Seeley Lake or Condon Area: Let’s start with your land or homeownership in the area.

1. How long have you been a land or homeowner in the Seeley Lake?
2. What has kept *or* drawn you and your family to the area?
3. What do you enjoy most about living in the area?

II. Experience with Wildland Fires:

“The fire season of 2000, 2001, 2003, 2007 had both direct and indirect impacts of the safety and well being of the Seeley Lake community” – 2004 Seeley-Swan Fire Plan. The Jocko Lakes Fire of 2007 may be

the focus of land/homeowner dialogue because of the currency of the event and because several areas of Seeley Lake were evacuated during the fire.

4. Were you living here in Seeley Lake or another location during the summers when there were significant wildland fires in the area?

5. General Experience: I am interested in how you experienced those fires. Can you tell me a little about your experience?

- Probe: Did you take precautions during the time of the fire?
 - Preparing to evacuate
 - Moving valuable items to another location
 - Setting up an “emergency” contact list with friends and family
 - Other: *list or note answers*

- Probe: Did you undertake any prevention measures or planning after the wildland fire?
 - Clearing trees and brush around structures
 - Making a future emergency/evacuation plans
 - Setting up an “emergency” contact list with friends and family
 - Other: *list or note answers*

III. Preparation for Future Wildland Fires: *the focus group for the interviews will be individuals who have contributed to hazard fuel mitigation practices on their property. Property owners with structure usually create defensible space. This is a 30 ft buffer of removing and modifying vegetation around their structures. Fuel mitigation can be applied to undeveloped property, the specific prescription for this work varies depending many factors including topography and existing types of vegetation. In the following questions: **Hazard fuel mitigation = “this project.”***

6. On a three-part scale, how would you identify as a private property aware with the need to undertaking wildfire protection measures in Seeley Lake.

I am very aware-----I am somewhat aware-----Not very aware

7. I understand that you have become involved in hazard fuel reduction and/or defensible space management on your private property.

Can you tell me when you have become involved in this project?

- Year:
- Time of year:
- Duration/length of project:

8. Can you show me or describe the general appearance of the fuel reduction work on your private property?

9. On a three part scale, how would regard the amount on hazard fuel reduction work accomplished on your property?

I have completed the work ----- Just started fuels reduction ----- I have not started any work

10. Can you tell me about why you become involvement in these efforts?

- Probe: Any other reasons?
 - Reduce impacts of a wildland fire.
 - Mountain Pine Beetle
 - Improve forest health - less competition between trees
 - Wildlife habitat
 - Enhance aesthetics to property
 - Other: *list or note answers*

11. How did you *initially* gather information about hazard fuel mitigation and defensible space management?

- Probe: any other sources of information?
 - Attendance at a public meeting
 - Through friends, co-worker, or family
 - Your own inquiry
 - Out-reach materials provided by fire department, state or federal land management agencies
 - Other: *list or note answers*

12. What steps were taken in order to accomplish the hazard fuel reduction and/or defensible space management?

- Probe: Any particular *person* who functioned as a key source of information on “this project”?
- Probe: Any community member or agency that provided *help initiating or completing* “this project”?
- Probe: Any sources of *financial assistance* or cost off-set for this project?
 - Grant cost-share program
 - Stumpage for trees
 - All expenses paid by property owner

13. What do you feel you have gained as any unexpected *benefits* from your involvement with hazard fuel reduction and/or defensible space management?

- Probe: Any other short or long-term benefits?

14. Did you encounter any unexpected adverse or unwanted impacts to your property as a result of the hazard fuel reduction and/or defensible space creation?

- Probe: Any other short or long-term unwanted impacts?

15. Where there any *barriers* to becoming involved with the hazard fuel reduction and/or defensible space management?

- Finances
- Information
- Substantial effort to undertake “this project”
- Didn’t want to change appearance

IV. Seeley Lake and Community Wildfire Protection:

16. On a three-part scale, how would you identify yourself as a private property concerned with the need for community wildfire protection in Seeley Lake?

I am very concerned-----I am somewhat concerned-----Not very concerned

17. What do you believe the community of Seeley Lake gains from private property owners undertaking hazard fuel mitigation and/or defensible space management?

18. What do you believe the role of the state and federal land management agencies should be in community wildfire protection? These land management agencies being primarily the DNRC and the USFS.

19. In closing, I am interested in whether you have any concerns regarding wildfire protection in the Seeley Lake area?

Appendix III: Interview Guide for Private Property Owners Who Have Not Implemented Fuel Mitigation

Private Property Owner Regard of Hazard Fuel Mitigation in the Wildland Urban Interface

Interview Guide for Private Property Owners Who Have Not Implemented Fuel Mitigation

Introduction: Thank you for agreeing to participate in this interview. My name is Jennifer Martynuik and I am a graduate student at the University of Montana, the College of Forestry and Conservation. My current work involves research into wildland urban interface communities such as Seeley Lake, Montana. A specific area of interest is the wildland fire protection measures taken on both public and private property.

This interview is one component of my graduate school research work. General information and/or segment of this interview may eventually become a part of my Master's Thesis.

In participating in this study, you will be assured of complete confidentiality – your name or any other identifying information will not be included in any written documents.

If it is Okay with you, I would like to digitally record this interview. This recording ensures that your views are accurately noted and it allows me to focus on what you are saying.

If would first please sign the "Subject Information and Informed Consent" document required by the University of Montana's Institutional Review Board.

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"The fire season of 2000, 2001, 2003, 2007 had both direct and indirect impacts of the safety and well being of the Seeley Lake community" – 2004 Seeley-Swan Fire Plan. The Jocko Lakes Fire of 2007 may be

the focus of land/homeowner dialogue because of the currency of the event and because several areas of Seeley Lake were evacuated during the fire.

4. Were you living here in Seeley Lake or another location during the summers when there were significant wildland fires in the area?

5. General Experience: I am interested in how you experienced those fires. Can you tell me a little about your experience?

- Probe: Did you take precautions during the time of the fire?
 - Preparing to evacuate
 - Moving valuable items to another location
 - Setting up an “emergency” contact list with friends and family
 - Other: *list or note answers*

- Probe: Did you undertake any prevention measures or planning after the wildland fire?
 - Making a future emergency/evacuation plans
 - Setting up an “emergency” contact list with friends and family
 - Other: *list or note answers*

III. Preparation for Future Wildland Fires: *the focus group for the interviews will be individuals who not have implemented hazard fuel mitigation practices on their property and/or around their structures.*

6. *If the property owner had structure on their land as a permanent or seasonal resident to Seeley Lake.* Are you currently aware of the practice of clearing brush, tree, and other fuels from around your house to reduce the risk of fire affecting you house and/or other structures? The clearing of fuel is often referred to as hazard fuel mitigation. The clearing within 30 ft of a structure is referred often referred to as defensible space management.

or

If the property owner had only undeveloped land – Are you currently aware of the practice of removing fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control?

7. On a three-part scale, how would you identify as a private property aware with the need to undertaking wildfire protection measures in Seeley Lake?

I am very aware-----I am somewhat aware-----Not very aware

8. If yes to question #6: How did you *initially* gather information about hazard fuel mitigation and/or defensible space management?

- Probe: any other sources of information?
 - Attendance at a public meeting
 - Through friends, co-worker, or family
 - Your own inquiry
 - Out-reach materials provided by fire department, state or federal land management agencies
 - Other: *list or note answers*

9. If yes to question #8. What did you think about this information?

10. Have you done any of hazard fuel mitigation - work on your property? If no, can you tell me why?

- Probe: Were there any other consideration for not undertaking fuel mitigation?

IV. Seeley Lake and Community Wildfire Protection:

11. On a three-part scale, how would you identify yourself as a private property concerned with the need for community wildfire protection in Seeley Lake?

I am very concerned-----I am somewhat concerned-----Not very concerned

12. What do you believe the community of Seeley Lake gains from private property owners undertaking hazard fuel mitigation and/or defensible space management?

13. What do you believe the role of the state and federal land management agencies should be in community wildfire protection? Theses land management agencies being primarily the DNRC and the USFS.

14. In closing, I am interested in whether you have any concerns regarding wildfire protection in the Seeley Lake area?