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Stanley Janos Cindrity

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Christine L Voyer
Major Professor's Signature

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HOME OWNERSHIP AND FIRE IN THE WILDLAND-URBAN INTERFACE: A STUDY OF PERMANENT AND SEASONAL HOMEOWNERS

By

Stanley Janos Cindrity

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ABSTRACT

HOME OWNERSHIP AND FIRE IN THE WILDLAND-URBAN INTERFACE: A STUDY OF PERMANENT AND SEASONAL HOMEOWNERS

By

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This study evaluated differences in seasonal and permanent homeowners' perceptions of and support for fuel management actions including prescribed burning, mechanical thinning, and defensible space in selected wildland-urban interface (WUI) areas in the U.S. A mail survey was employed with a random sample of 2,781 households (returned were 939 for a 38% response rate) in three study sites, including residencies in/near San Bernardino National Forest (NF), CA; Grand Mesa, Uncompahgre and Gunnison NF/Bureau of Land Management land, CO; and Apalachicola NF, FL. Experiences with wildland fire and fuel reduction techniques differed greatly by study site, homeowner type and fuel technique. The implications are planners, resource managers, and policy makers need to consider that homeowners may differ in their attitudes toward and experiences with fuel reduction techniques. Better knowledge of homeowners can facilitate public support and understanding of fire policy, which then leads to better fuel management, improved public involvement, and enhanced communications with fire/land managers and homeowners in effected WUI areas.

DEDICATION

I dedicate this thesis to the late Cindric Stanco, my grandfather; to my parents and sisters who have supported me through my entire academic career; and, of course, to Dr. Christine Vogt, who has been a wonderful committee chair; and, Drs. Charles Nelson, and Maureen McDonough who have been helpful committee members.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

As our population continues to increase, more people will choose to live adjacent to or within rural, natural resource areas. Many will choose this wildland-urban interface as a viable option to build or purchase a retirement or permanent home. Traditionally, some households have chosen rural areas over urban or suburban areas as their home. Seasonal and retirement home purchases have also increased in rural areas and are projected to continue to increase particularly in the wildland-urban interface (Johnson, 2000). A permanent home is defined as a residence where the owner lives in the unit all, or most, of the year and is listed on the mortgage (United States Census, 2000); whereas, a seasonal home is defined as a recreational or occasional use housing unit that is used or intended for use only in certain seasons, for weekends, or other occasional use throughout the year (United States Census, 2000). The wildland-urban interface is a region where these two types of homes are built within a community in close to flammable fuels (Resource Management Education Unit, 2001). Johnson (2000) reports migration from urban to rural areas has accounted for 58 percent of the population increase in rural areas between April 1990 and July 1999. The decision making process, in regards to seasonal home purchase, is complex and involves many different variables (Bright & Manfredo, 1995; Stewart & Stynes, 1994). One of these variables is the threat of wildland fire. Living adjacent to or within natural areas where wildland fire typically occurs heightens the human risks associated with wildfire.

As more people purchase or build seasonal homes in the wildland-urban interface, the risk to life and property losses increases. Plevel (1997) suggests most structural damage from wildfire is caused by more homes being built in the wildland-urban interface. Egan and Luloff (2000) found that, "Exurbanization, or the migration of urban residents to rural environments, has increased over the past two decades, often motivated by perceptions of an improved quality of life in rural areas" (p. 26). Further, Johnson (2000) found population gains have been more common in counties near urban centers, than in further removed rural counties that are dependent on agriculture and mining. Some of the in-migration to these wildland-urban fringe areas is from retirees and second or vacation home buyers (Godbey & Bevins, 1987; Stewart & Stynes, 1994; Stromberg, 2000), and primary home purchasers who live further out from the city to enjoy a rural, natural setting (Marans & Vogt, 2000; Plevel, 1997). The probability of ignition of fuel accumulations is increased as more people populate forested areas (Plevel, 1997). The heightened costs and risk of wildfire in the wildland-urban interface begs for evaluation of the public's perception and knowledge of fuel treatments to target fire policy at the wildland-urban interface and manage this rapidly changing landscape. This study described homeowners living in selected wildland-urban interface areas and evaluated their participation in and attitudes toward fuel reduction programs that were designed to reduce fire risk.

Statement of the Problem

The problem of the study was to understand homeowners' experiences with wildland fire and fire management programs, their beliefs and opinions about

fire and fire management programs in their neighborhood and community, and to assess whether homeowners who live full-time are similar to those who live part-time in the areas. These areas of potential similarities include current beliefs about wildfire and local fire management policies, their level of support for local forest management policies, any personal fire/fuel reduction efforts, and any involvement in fire-related programs such as Firewise Councils and Red Cross Volunteer Programs. Specifically, homeowners were asked: (1) the extent to which fuel treatments have been implemented on or near their property, (2) how they have considered the risk of fire during their home tenure, (3) and their current beliefs and attitudes about fire risks and local forest management programs including prescribed burning and mechanical thinning.

Purpose of the Study

The information obtained in the study can: (1) provide an understanding of similarities and differences between seasonal and permanent home owners in the extent to which fuel treatments have been implemented, perceptions of fire-related risk, and their beliefs, attitudes and support of fuel treatments, (2) facilitate the development of fire policy and fire/fuel management by resource agencies and local governments, (3) provide an understanding of prospective and existing homeowners' communication patterns with local resource and fire managers, and (4) increase the understanding of homeowners in the wildland-urban interface.

Justification for the Study

The effects of population changes in the wildland-urban interface can be significant, affecting local forest-based economies and social structures, attitudes about forest management practices, and ultimately forest management policies (Egan & Luloff, 2000; Nelson, 1992). To better understand the social and environmental dynamics in the wildland-urban interface, it is necessary to understand the migration of urban homeowners to rural environments, past forest management practices, and fire/fuel management practices.

As more people move into the wildland-urban interface it is necessary to assess the support of fire management techniques. Manfredo et al. (1990) found that the public is divided in its support of prescribed fire policies, including prescribed burning and mechanical removal of flammable vegetation in Wyoming and Montana. This means that the public, " . . . [V] iews that areas with a preservation mandate should be managed so that natural processes predominate, and fires are important events instrumental in the dynamic processes that shape wilderness ecosystems" (p. 19). It may be deduced that the public is divided in its support of prescribed fire policies in protected areas. Because of the public's divided support for prescribed fire policy, more research is needed to evaluate the public's perception and attitude in regard to fire policy and living in the wildland-urban interface. Public support, for prescribed fire, is important because this fuel treatment is most effective, least expensive, and parallels natural processes (Wilkinson, 2001).

Information about the benefits and costs of these fuel treatments is necessary because this may change the public's knowledge and perception of prescribed fire. Bright and Manfredo (1997) maintain, "Process theories of attitudes formation and attitude change suggest that information influences attitudes by affecting the nature of cognitions that are elicited" (p. 469). Information about the benefits of fuel treatments is necessary because this may change the public's knowledge and perception of prescribed fire. Ajzen and Fishbein (1980) suggest external variables, such as age, gender, or occupation, affect beliefs that lead to certain outcomes. In particular, external variables such as length of annual residency (permanent or seasonal homeowners), fire-related experiences, and geographic area may affect beliefs that fuel treatments produce certain outcomes. This is followed by attitudes toward behavioral intentions, and, ultimately, behavior. By measuring the public's knowledge, beliefs, and attitudes toward fuel treatments, policy makers and land managers may be able to better manage forests and quality of life in the wildland-urban interface.

For over 70 years Smokey Bear has helped Americans form perceptions that forest fires damage our natural resources. Fuel accumulations have reached an all time high in many of our nation's forests due in part to lack of natural fire processes and active fuel hazard mitigation programs (Wilkinson, 2001). When forest fires such as the 1988 fires in Yellowstone National Park occur, they make national news and are viewed solely as destructive, perpetuating the misnomer of mass forest destruction.

Nearly 70 years later, after the initiation of Smokey Bear, and escalating fuel build-ups, scientists and policy makers realize that fire plays an essential role in resource management. Scientists realize that fire occurs naturally in forest ecosystems. Many species of trees, such as the longleaf pine, rely on fire as a part of their reproductive cycle (Stolzenburg, 2001). Since land managers have suppressed much of this natural process and have been unable to conduct mechanical thinning (e.g. timber harvest) due to environmental restrictions, they are faced with new problems as our population continues to increase and inhabit wildland areas. As a result of this population increase and changes in preferences for where people desire to live, more people are choosing to live adjacent to or within natural areas, or the wildland-urban interface. Fried et al. (1999) maintain that the wildland-urban interface is any residential development in an area with fire-adapted vegetation. These regions may include natural areas, including forests and other heavily vegetated areas.

Today, the United States Department of Agriculture Forest Service and other local, state or federal land managing agencies are under increased pressure to reduce the risk of fire or loss of homes and lives. Toward that goal there are many possible programs that can reduce the risk. These include pre-fire treatments, such as prescribed fire, mechanical/manual thinning, herbicides, local ordinances that require fire retardant roofs and building materials, housing setbacks away from trees, animal grazing, and firebreak lines. Most of these programs require public or community outreach to educate and assist local homeowners. Some homeowners such as retirees or vacation/weekend

homeowners may not occupy or care for their homes in the off-season or weekdays, making it increasingly more difficult to reach these homeowners. To better understand a variety of homeowners who live in wildland-urban interface areas, research is needed to evaluate homeowners' knowledge of wildfires and associated risks, understanding of fire management and fire recovery programs, and intentions or actions to reduce fire risk.

Fuel treatments are a fire management technique that reduces or rearranges fuels (Pyne, 1984). According to Pyne, "To modify fuels is to modulate fire behavior, fire effects, and the costs of fire suppression" (p. 313). Fuel treatments include: prescribed open burning, intensive utilization of residue, yarding of unmerchantable materials (YUM), conversion of the debris into chips, portable incinerators with the prospect of smoke-free burning, burial of debris, salvage logging, crushing slash, and animal grazing (Pyne, 1984). Shindler and Reed (1996) suggest that the public supports mechanized thinning treatments over prescribed fire treatments as a method of reducing fuel accumulations in the Blue Mountains, Oregon. This preference in fuel treatment (i.e., thinning) is due to limited changes in wildlife habitat, recreation use, visual quality, and smoke levels. By reducing fuel accumulations, homeowners may protect their property from potential forest fire risk. As more people migrate from urban areas to rural areas, seasonal and permanent homeowner attitudes and beliefs toward fire management/policies and decision-making will become more important to natural resource managers and researchers. In total, a study which addresses seasonal

and year-round home ownership and fire in the wildland-urban interface can provide useful information for a wide range of interested parties.

Framework for Understanding Homeowners in Wildland-Urban Interface Areas

The framework for understanding seasonal and permanent homeowners in wildland-urban interface areas is useful in understanding the decision making process towards implementing fuel treatment programs (Figure 1). This framework not only guided the research, but also provided a theoretical model for examining human behavior. The framework consisted of three phases: (1) the home buying process,

(2) a description of the resident, residency, and purpose of residence, and recreation patterns, and (3) current attitudes toward fuel treatments and living in the wildland-urban interface. The Theory of Reasoned Action (Ajzen & Fishbein, 1980) is an integral part of the third phase of the framework in understanding the current beliefs, attitudes, and intentions to support fuel treatments in the wildland-urban interface.

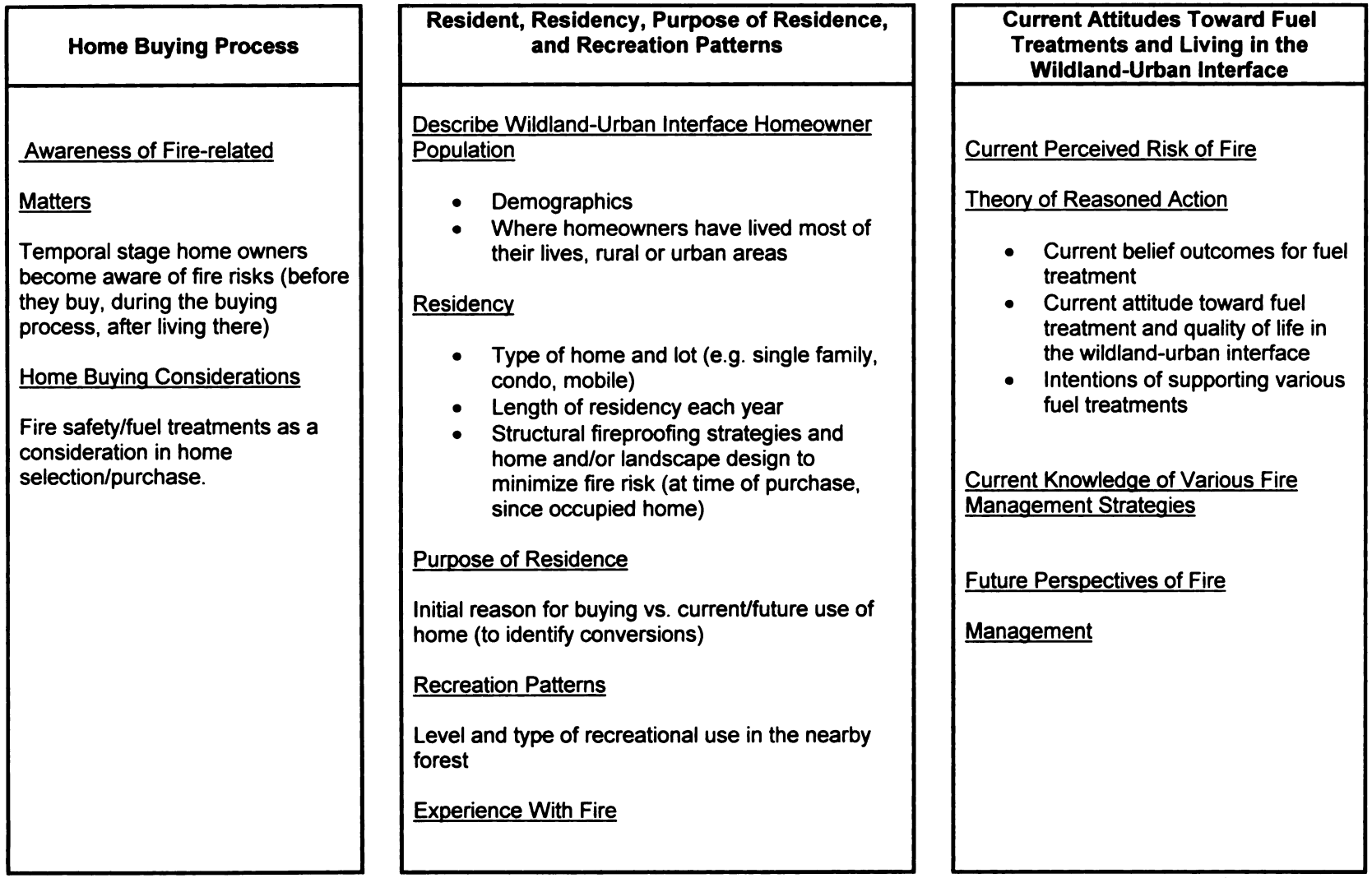

Figure 1. Framework for Understanding Seasonal and Permanent Homeowners in Wildland-Urban Interface Areas Implementing Fuel Treatment Programs

Delimitations

The delimitations of the study were as follows:

1. The three study sites included: San Bernardino National Forest, Big Bear, California, Grand Mesa, Uncompahgre and Gunnison National Forests/BLM (GMUG), Colorado and Apalachicola National Forest, Florida.
2. A sample of 1,000 households specifically, current homeowners, at each study site, selected from county tax records. A stratified sample was based on the proportion of residents from permanent and seasonal estimates provided by the 2000 Census.
3. Data collection occurred in winter of 2001, using the most recent homeowner tax records.
4. Businesses, land only parcels, and renters were excluded from the study.
5. The study focused on social science research using a self-administered questionnaire. This instrument was formulated and based on a review of the literature for scales measuring homeowners' beliefs and attitudes. Development of the instrument also included focus groups with homeowners and interviews with fire managers at each site.

Limitations

The study was limited by:

1. Ambiguities in tax records, causing seasonal homeowners to be difficult to identify through tax records (i.e., non-local mailing addresses and non-homestead property were assumed to be seasonal, or some other classification used by the local taxing authority).
2. Participants were only sent one survey per household, therefore the adult selected to complete the survey may not represent the opinions of all adult household members.
3. Active homebuyers not already living in the area were not addressed in the study, and instead the survey asked homeowners to think back to the purchase of the home (in retrospect).
4. The power of statistical testing. That is, a higher number of respondents would have resulted in lower statistical error and more accurate statistical tests.

Assumptions

The study was based upon the following assumptions:

1. Knowledge of various fire management strategies may vary by study site and home location (in terms of proximity of forest boundaries), forest/fuel type, recency of wildland fire or fuel treatments, and duration of ownership.

Definition of Terms

For consistency of interpretation the following terms were defined:

Defensible Space. A perimeter consisting of 30 feet around a structure that is accessible by fire engines, personnel, and other fire fighting resources. This space is typically free from trees, landscaping, and other obstructions that would prevent, or impair fire-fighting efforts (Monroe & Marynowski, 1999).

Fire-wise Structures/Building Materials. Construction techniques, or materials, that reduce the likelihood of structural ignition. They include fire resistant asphalt roof shingles, fire-wise landscaping, maintaining a defensible space, prevention of fuel accumulations adjacent to structures, and locating firewood and propane tanks outside the defensible space (Monroe & Marynowski, 1999).

Fuel Treatment. A method of reducing fuel accumulations in natural areas through prescribed fire, manual and/or mechanical thinning. This procedure is used to improve the overall health of forest ecosystems and minimize the threat of wildfire (Shindler & Reed, 1996).

Management-Ignited Prescribed Fire. The planned application of fire to natural fuels, including logging debris, grasslands and/or understory vegetation with the intent to confine the fire to a predetermined area (Resource Management Education Unit, 2001).

Manual Thinning. A fuel treatment that involves the removal, or reduction, of fuel accumulations in natural areas through the use of trained personnel, hand tools, chainsaws, and other related manual procedures (Shindler & Reed, 1996).

Mechanical Thinning. A fuel treatment that involves the use of mechanized equipment, personnel, and other technologies to remove, or reduce, fuel accumulations in natural areas (Shindler & Reed, 1996).

Permanent Homeowner. A housing unit is owner occupied if the owner lives in the unit even if it is mortgaged or not fully paid for. A residence where the owner lives in the unit all, or most, of the year and is listed on the mortgage (United States Census, 2000). Most of the year is defined as more than six months of residency annually.

Seasonal Home. Seasonal, recreational, or occasional use housing units include vacant units used or intended for use only in certain seasons, for weekends, or other occasional use throughout the year. Interval ownership units sometimes called shared ownership or time-sharing condominiums are included in this category (United States Census, 2000).

Wildfire. Any fire occurring on wildlands that is not meeting management objectives and thus requires a suppression response (Resource Management Education Unit, 2001).

Wildland-Urban Interface. Areas where human communities are built in close proximity to flammable fuels (Resource Management Education Unit, 2001).

Summary

This chapter has provided the essential introductory elements for the study, including a brief overview of the importance of understanding the demographic shift to the wildland-urban interface and the relevance this has on

fire and fuel management, the problem statement, purpose of study, definition of terms, limitations, delimitations, and assumptions of the study. The next chapter will provide a literature review designed to provide a theoretical basis for this study and evidence of the appropriate measurement and scales.

CHAPTER 2

REVIEW OF LITERATURE

The review of literature is presented under the following topics: (1) the definition of the wildland-urban interface, (2) the definition of fuel treatments, (3) the demographic shift to wildland-urban interface areas, (4) risks associated with living in the wildland-urban interface, (5) management considerations for the wildland-urban interface, (6) the application of the Theory of Reasoned Action with fire research, (7) beliefs and attitudes towards fuel treatments, and (8) intention to support fuel treatments. The chapter ends with a summary of the literature review and hypotheses statements.

Defining the Wildland-Urban Interface

The wildland-urban interface is a relatively new concept that is complex and consists of many components. To broadly understand the meaning of the wildland-urban interface, several definitions are examined. Most simply, the wildland-urban interface is defined as areas where human communities are built in close proximity to flammable fuels (Resource Management Education Unit, 2001).

Ewert et al. (1993a) defined the wildland-urban interface as different patterns of mix between developed and natural landscapes; an area that managerially reflects advanced society values such as congestion; or an area that can be thought of as a natural resource "ecotone" (p. 7). An ecotone is defined as an area of transition between developed and natural communities where a series of attributes exist and more than likely interact in different ways.

These include social, spatial, ecological, biological, and managerial attributes. Some examples of social attributes include changing land ethics, and a broader spectrum of natural resource demands (Ewert et al. 1993a). Spatial attributes include high density, year-round use, ease of access, and close proximity to large cities; whereas, ecological and biological attributes include greater impact upon ecological systems, reduction in wildlife habitat, and high levels of site pollution. Examples of managerial attributes include saturation of available resources, emphasis of law enforcement and visitor regulation, and changing zone strategies (Ewert et al., 1993a). A clear demarcation does not just simply exist between human communities and the proximity of these communities to flammable fuels. Moreover, demographic characteristics, and reasons why people choose to live in ecotone areas influence how wildlands are characterized and managed.

Davis (1990) defined the wildland-urban interface as a series of three zones based on demographic characteristics and land management problems. The three zones include the classic interface, the intermix, and the isolated interface. The classic interface is characterized as the place where the greatest numbers of people live, an area of urban sprawl, and where homes press against the wildland. This type of interface area poses the greatest risk of property loss in comparison to other types of interface areas as it generally contains the largest number of homes. Davis (1990) defines the intermix interface as, ". . . [The wildland-urban interface] ranges from single homes or other buildings scattered throughout the wildland area to medium-sized subdivisions . . .[I]solated

structures—typically summer homes, recreation homes, ranches, and farms—are surrounded by large areas of vegetation" (p. 17). In general, if a fire were to start it would be difficult to protect these homes because of the diversity of homeownership (seasonal and permanent) and a large geographic area could be burning. Remote areas of wildland within an urban area are characterized as the isolated interface. This occurs when islands of undeveloped land are left between cities, such as parks, reserves, and other natural, heavily vegetated areas.

Pyne (1984) defined the wildland-urban interface as, ". . . [T]he crowding of housing developments against public wildlands along an often indefensible frontier"
(p. 267). Similarly, Cohen (2000) suggests, "In the wildland fire context, fire managers commonly refer to vegetation as fuel. However, for the specific context of W-UI residential fire losses, a house becomes the fuel" (p. 17). Cohen and Pyne purport that the true interface is interpreted as the relative location of a structure, or home, to wildland fuels. To reduce wildland-urban interface fire loses, in the context of home ignitibility, this procedure involves mitigating the fuel and heat components to prevent ignitions. Since people choose to live adjacent to or surrounded by public natural resource areas, land and fire managers in public agencies often must address wildland-urban interface, including fuels that burn, in forest management and policy making.

Defining Fuel Treatments

A fuel is anything that burns. Land managers are becoming increasingly interested in identifying and mitigating fuels in the wildland-urban interface. Thus, a fuel reduction program seeks to reduce fire hazard through diminution and rearrangement of available fuels (Pyne, 1984). Pyne (1984) defined fuel treatment management as, "Fuel modification that comes through processes of reduction, in which the load of available fuel is decreased; of conversion, by which certain fuels are replaced by others with different flammability; and of isolation, through which large expanses of fuels are broken up with fuelbreaks or greenbelts" (p. 405). Many fuel treatments are available for reducing fuel accumulations including: yarding of unmerchantable materials (YUM), intensive utilization of residue, timber harvest, prescribed open burning, conversion of the debris into chips, burial of debris, salvage logging, portable incinerators with the prospect of smoke-free burning, crushing slash, and animal grazing (Pyne, 1984). Pyne believes it is important to modify fuels since this action will modulate fire behavior, fire effects, and the costs of fire suppression. Petak and Atkisson (1982) defined three strategies to reduce hazard losses: mitigating the hazard through landscape modification; minimizing vulnerability by building design and construction; and limiting the exposure of the population to the hazard. Building on these definitions of fuel treatments, three fuel treatments are considered in this thesis. First is mechanical fuel reduction which decreases the load or density of flammable vegetation in an area or breaks up fuels with greenbelts of less flammable vegetation. The second fuel treatment is defensible

which is landscape modification by private landowners. The third fuel treatment is prescribed burning which can also reduce the available fuel and possibly replace fuels with other types of less flammable varieties.

Each of these fuel treatments are examined more closely. Manual thinning is defined as a fuel treatment that involves the removal, or reduction, of fuel accumulations in natural areas through the use of trained personnel, hand tools, chainsaws, and other related manual procedures (Shindler & Reed, 1996). Mechanical thinning is a fuel treatment that involves the use of mechanized equipment, personnel, and other technologies to remove, or reduce, fuel accumulations in natural areas. Mechanical fuel treatments produce limited changes in wildlife habitat, recreation use, visual quality, and smoke levels. By reducing fuel accumulations, homeowners may protect their property from potential wildland fire risk (Monroe & Marynowski, 1999; Shindler & Reed, 1996).

Defensible space is another way to both protect homes and reduce fuel accumulations. Hodgson (1995) defined defensible space as, ". . . [A] collection of actions, including vegetation management around structures, that will provide a safe place to defend the structure and reduce the vulnerability of the structure to ignition" (p. 94). Monroe and Marynowski (1999) recommend that defensible space consist of a perimeter consisting of 30 feet around a structure that is accessible by fire engines, personnel, and other fire fighting resources. Defensible space is typically free from trees, landscaping, and other obstructions that would prevent, or impair fire-fighting efforts. Defensible space includes other aspects of fire protection that include street and address signage, adequate

roads and water supplies, where all are provided in an effort to defend individual structures easily, safely, and more effectively (Hodgson, 1995).

Prescribed fire is also an effective management technique to manage fuel accumulations. Prescribed fire is defined as the planned application of fire to natural fuels, including logging debris, grasslands and/or understory vegetation with the intent to confine the fire to a predetermined area (Resource Management Education Unit, 2001). Prescribed fire is different than wild or naturally created, or human caused fires. Prescribed fires are initiated and handled by land managers to meet management objectives which include reducing fuel accumulations, restoring wildlife habitat, and improving forest vitality. Pyne (1984) maintains, "A prescribed fire promotes the general land management goals of the responsible agency, whereas a wildland fire does not. The boundary is socially defined, often narrow, and changes continually" (p. 538).

Demographic Shift to the Wildland-Urban Interface

Besides the attention on fuels and land management in wildland-urban interface areas, there is growing interest in the type and volume of people and their lifestyle in wildland-urban interface areas. As the population of our nation increases it is likely that more seasonal and permanent homeowners will choose to live within the wildland-urban interface or rural areas (Eagan & Luloff, 2000; Gardner et al., 1985; Johnson, 2000). It is important to understand this demographic shift, including the rate and where this is occurring, and the decision making process in purchasing or building a home. As this migration

from urban to rural areas continues, Johnson (2000), a demographer studying population change, found that non-metropolitan gains have been more common in counties near urban centers, than in further removed rural counties, dependent on agriculture and mining. Johnson (2000) found that, "Between 1990 and 1999, the net influx of those under the age of 65 to nonmetropolitan areas has been much higher than would have been expected given historical trends" (p. 10). Johnson (2000) also found that nonmetropolitian areas had an estimated net inflow of 2,243,000 people during the same time period compared to a net outflow of 1,370,000 people during the 1980s. This suggests that those under the age of 65 account for a considerable majority of the migration fueling the rural rebound of the 1990s (Johnson, 2000). Egan and Luloff (2000) found that, "Exurbanization, or the migration of urban residents to rural environments, has increased over the past two decades, often motivated by perceptions of an improved quality of life in rural areas" (p. 26). This means that more and more people are attracted to living in rural environments.

Some households choose to move to a rural area on only a part-time basis. According to Stromberg (2000), ". . . [A] survey done by the National Association of Realtors (NAR), [indicated] vacation home sales increased 9.3% from 1997 to 1999, with approximately 377,000 homes sold in 1999" (p. 44). Many of these seasonal homes are being purchased by the baby boomer generation (i.e., individuals born between 1946-1964), which could be converted to permanent residences upon retirement (Godbey & Bevins, 1987; McHugh el at., 1995). The decision making process, in regards to seasonal home purchase,

is complex and involves many different variables (Bright & Manfredo, 1995; Stewart & Stynes, 1994).

Stewart and Stynes (1994) found that, "The process of choosing one alternative over others involves making a series of decisions in which an individual's motivations, preferences, knowledge, cognitive processes, resources, and constraints all play a role" (p. 71). Stynes et al. (1997) also found that the seasonal home choice process often takes the prospective buyer many years to complete, involves a sizable share of their income, and has long-range consequences. One of these possible consequences is the threat of wildland fire.

As more people purchase or build seasonal homes in the wildland-urban interface, the risk to life and property losses increases. Plevel (1997) found that most structural damage from wildland fire is caused by more people building homes in the wildland-urban interface. Land managers are faced with many challenges, including balancing fire/fuel management with an increasing population of seasonal and permanent homeowners within the wildland-urban interface.

Risks Associated with Living in the Wildland-Urban Interface

Living adjacent to or within natural areas where wildland fire typically occurs increases the risks associated with wildfire. It is important to understand how homeowners develop perceptions toward fire-related risk, the operationalization of risk attitudes, and how homeowners balance these risk attitudes with the benefits of living in the wildland-urban interface. Beebe and

Omi (1993) found that the media plays a critical role in forming public perceptions of fire risk. Often media reports are distorted which could result in public misconceptions about wildland fires. Toward that end, public participation and education campaigns are important in changing homeowners' perception of fire-related risk.

Weber and Milliman (1997) found that risk preference is operationalized as risk attitudes that are derived from people's choices. Homeowners who make the choice to live in the wildland-urban interface are willing to accept a certain level of risk (Gardner et al., 1987). Dyer and Sarin (1982) maintain relative risk attitude is an attempt to separate marginal value for outcomes from attitudes towards uncertainty. In other words, homeowners may attempt to separate possible outcomes of fire-related risks from attitudes of uncertainty. If homeowners understand the risk associated with living in the wildland-urban interface, they may be able to justify the benefits associated with such living while accepting these attitudes of uncertainty. Similarly, Weber and Milliman (1997) found that, ". . . [A] decision maker has a tendency to be attracted or repelled by alternatives that he or she perceives as more risky over alternatives perceived less risky" (p. 128). Assessment of alternatives may provide a solution to potential problems, such as homeowners implementing a defensible space around a residence or reducing fuel accumulations on their property. Homeowners may be able to separate attitudes of uncertainty towards wildland fire by evaluating the benefits of living in the wildland-urban interface.

For instance, several benefits advance the decision to purchase a second home: compensation for urban living by temporarily escaping to the countryside; a worthwhile financial investment; a place to achieve short-term leisure objectives, or the long-term objective of developing a suitable place to which one many retire (Clout, 1977). However, there are also costs or risks to living "closer to the forest" (Fried et al., 1999a; Winter & Fried, 2000). Some risks include possible loss of property through wildfire, social impacts to natural resources, and additional expenses associated with fire-wise construction and landscaping. As more people migrate from urban areas to rural areas, seasonal and permanent homeowners' perceived risk, beliefs, and attitudes toward fire management, policies, and decision-making will become more important to natural resource managers and researchers (Bradley, 1984; Bright & Manfredo, 1997; Bright et al., 1995).

Management Consideration for the Wildland-Urban Interface

Though the wildland-urban interface is a relatively new concept, our nation's settlement history, past forest management practices, and recent developments in forest management and science has had a direct affect on the overall condition of forested areas. An understanding of the events that lead to the current condition of forested areas, particularly wildland-urban interface areas, in the United States is important in comprehending how these areas may be managed in the future.

The concept of a wildland-urban interface is tied to the two centuries of settlement history (Bradley, 1984). Early settlers relied on farming for their

existence, which involved clearing farmland and pastures, and building communities within natural areas. With increased development and technology, settlers and new immigrants moved to urban centers during the Industrialized Revolution to seek employment in factory work. For most of our nation's history, cities in the United States have grown at the expense of rural areas (Davis, 1990). Since the 1940s there has been a shift from urban to suburban and rural areas by the postwar baby boomer generation
(Davis, 1990). With this shift there has been an increased number of people who live in or adjacent to forests and woodland areas. Davis (1990) maintains, "While these trends may reflect public appreciation of the amenities available in rural areas, it has also greatly increased the number of primary residences, second homes, retirement homes, and mobile homes located in proximity to the nation's wildlands" (p. 6).

The forest service's mascot and public relations campaign using Smokey Bear was intended to reduce the number of human created fires, but it has also caused Americans to form perceptions that forest fires harm and destroy our natural resources. In recent times, fuel accumulations have reached an all time high in many of our nation's forests, due in part to lack of natural fire processes (Wilkinson, 2001). Because of anthropogenic influences on forest management, fire suppression has promoted stand homogeneity and the associated problems of insects and disease, which disrupts natural processes, that were historically maintained by wildland fires (Kimmer & Lake, 2001). Since land managers and the public have prevented these natural processes, fuels have accumulated in

natural areas. As a result, when forest fires such as the 1988 fires in Yellowstone National Park occur, they make national news and are viewed solely as destructive, which perpetuates the misnomer that wildland fires result in the mass destruction of forests.

Policy and management practices are increasingly realizing that fire plays an important role in resource management and that fire is a naturally occurring phenomenon that effects the larger ecosystem. Many species of trees rely on wildland fire for their reproductive cycle. For example, lodgepole pines require wildland fire to open their serotinous cones, which results in the dissemination of seeds (Pyne, 1984). Since resource managers have prevented much of this natural process, they are faced with substantial fuel loads that are located near the areas that people are moving to.

The American public is placing increased pressure on the United States Department of Agriculture Forest Service, other local, state or federal land agencies to reduce the risk of fire or loss of homes and lives (Cohen, 2000). There are many possible programs that can reduce the risk. These include pre-fire treatments, such as prescribed fire, mechanical/manual thinning, local ordinances that require fire retardant roofs and building materials, housing setbacks away from trees, and firebreak lines (Cohen, 2000). To fully implement these programs, fire management officials must implement public or community outreach programs to educate and assist local homeowners in reducing fuel accumulations on their property. Because some seasonal homeowners may spend less time at their residence, seasonal homeowners such as retirees or

vacation/weekend homeowners may not occupy or care for their homes in the off-season or weekdays, making it increasingly more difficult to reach these homeowners. Special considerations must be taken to ensure that both seasonal and permanent homeowners participate and cooperate in active fuel hazard mitigation programs. It is important the land managers recognize and understand the series of management zones that compose the wildland-urban interface.

The wildland-urban interface is comprised of a series of six zones that include Development, Conversion, Modified Practice zone, Non-Industrial Parcelization, and Forest (Bradley & Bare,1993). As one moves along the continuum of zones, management concerns and the degree of urban encroachment decreases.

The first zone, Development, is characterized as including residential, commercial, recreational, and industrial development. This zone is attractive for development because of potentially lower market prices for land as one moves away from urban areas with easy commuting distance to cities. Several problems exist in the development zone as it pertains to the wildland-urban interface. Often developers and homeowners realize insufficient fuel buffers have been provided as part of the development. Bradley and Bare (1993) also suggest, "Not only does the landscape take on a new image after development, but many timber management practices (including timber harvest, the use of fire, chemicals, and heavy equipment) are in conflict with the new owner's perceptions of how adjacent lands should be used" (p.22). Possible

management solutions include clustering housing developments rather than the increase of 10-acre-minimum lots throughout the forest. Bradley and Bare (1993) also suggest, "By increasing densities, we not only consume less land area, but we create opportunities for managing lands within developed areas" (p. 22).

The next zone, Conversion, is defined as ". . . [L]and in forest cover that is expected to change to another use fairly soon. This may be productive forest resource land, or it may be marginal land in terms of its ability to produce forest outputs including recreation, timber, and wildlife" (Bradley & Bare, 1993, p.24). In other words, conversion is prompted by an owner's expectations that a more profitable use for this productive forest resource exists, namely development of residential lots and homes. This is a form of both urban and natural resource development, including agriculture. Several factors contribute to a landowner's decision to convert land use, ". . . [F]avorable zoning decisions by local government, a change in tax status, or a change in the use of adjoining lands" (Bradley & Bare, 1993, p. 24). These changes may also require the implementation of transportation infrastructure. It is important to understand the process by which land is converted and developed at the wildland-urban interface. Because of this development, land managers may better understand the Modified Practice Zone.

The Modified Practice Zone is, ". . . [A]n area in which traditional forest land management practices are modified to allow for the continuation of present forest uses, while at the same time making such uses more compatible with

adjacent land uses" (Bradley & Bare, 1993, p. 25). Land managers face challenges as they maintain the wildland-urban interface as a working forest, while providing other resource benefits to the public. For example, land managers may be required to balance timber-harvesting practices while meeting the outdoor recreational needs of the public. Because of these management objectives, the Non-Industrial Forest Parcelization Zone is identified to mitigate potential management issues as they pertain to forest management in the wildland-urban interface.

The Non-Industrial Forest Parcelization Zone is characterized from the other zones based on parcel size. It incorporates two types of land use with two different types of owners. The non-industrial forest landowner has a parcel ranging from 5 to 500 acres with a main objective to grow trees for commercial harvest (Bradley & Bare, 1993). Large lot landowners are generally homeowners who are seeking property as an affordable place to live, or a place to escape on weekends where the amenities of the forest may be enjoyed. Management challenges that exist in this zone include, "[Natural resource professionals] need to deal with the problems of minimum lot-size requirements to maintain productive, safe, or aesthetically pleasing landscapes, especially as these problems are related to the perceptions of urban planners" (Bradley & Bare, 1993, p. 29). In other words, the segmentation of forest land must be considered in resource planning and infrastructure development.

In total, the wildland-urban interface may be viewed as a continuum of a series of zones between land uses and management. Issues of economics,

aesthetics, physical and biological productivity, existing use, and jurisdictional boundaries pose constraints to land managers (Bradley & Bare, 1993). Land managers face many challenges with managing fuel accumulations, the public, and constantly changing and evolving forest uses.

To mitigate fire hazard risk, Gardner et al. (1987) found that, ". . . [H]omeowners prefer policy strategies that physically alter the wildland landscape—through prescribed burning programs or greenbelt land uses—or regulations placed on building materials" (p.171). Initial awareness of the fire hazard situation influences present awareness, which in turn influences future risk perceptions (Gardner et al., 1987). Garner et al. (1987) found that homeowners would rather have the landscape modified for their needs than modify their behavior to live compatibly within the environment. Similarly, Green et al. (1996) found that seasonal and permanent homeowners hold significantly differing positions regarding land use and zoning; seasonals were more supportive than permanent homeowners of land use controls and zoning.

Forest health-related issues are also a critical component of land management. Fule et al. (2001) found that fuel hazard reduction benefits of forest restoration are apparent as soon as thinning and burning have been implemented. In other words, forests seem to respond quickly to fuel treatments as a means to restore these ecosystems to a more natural state. According to Fule et al. (2001), "Fire hazard is only one of many variables that enter into ecosystem management decisions" (p. 28).

Land managers must understand that maintaining natural resource areas is part of a complex problem, which has its beginnings in our settlement history and past forest management practices. Recent developments in forest management and science have facilitated an understanding of fire-related issues as they pertain to managing the wildland-urban interface. Land managers must first understand why people live in wildland-urban interface areas and develop ways to get homeowners involved in fire education and fuel hazard mitigation programs.

Application of the Theory of Reasoned Action with Fire Research

Homeowners' beliefs, attitudes, and support of fuel treatments are important in understanding their intent to implement fuel hazard mitigation programs. Information about the benefits and costs of fuel treatments is necessary because this can possibly change the public's knowledge and perception of prescribed fire. Ajzen and Fishbein (1980) suggest beliefs, attitudes toward behavioral intentions, and, intent to act are critical components in predicting social behavior. External variables such as length of annual residency (permanent or seasonal homeowners), fire-related experiences, and geographic area may affect homeowners' beliefs that fuel treatments produce certain outcomes (Figure 2).

Beliefs, attitudes, and support of some behavior are important components of the Theory of Reasoned Action. By evaluating additional explanatory variables (Figure 2), researchers may better understand the relationship between beliefs, attitudes, and support. Bright and Manfredo (1997)

found that, "Process theories of attitudes formation and attitude change suggest that information influences attitudes by affecting the nature of cognitions that are elicited" (p. 469). If homeowners' understand that implementing fuel treatments will reduce fire-related risks, this may affect their beliefs and attitudes toward fuel treatments. Bright and Manfredo (1995) found that one method of social inquiry is the assessment of public attitudes toward natural resource issues. One way of assessing the quality of attitudinal information is to look at the predictive validity of attitudes and their ability to predict behavior regarding natural resource issues. According to Bright and Manfredo (1995), the strength of attitudes toward management strategies, the personal importance of natural resource issues, and the availability of information on the issue need to be understood to model attitudes predicting the support for management strategies.

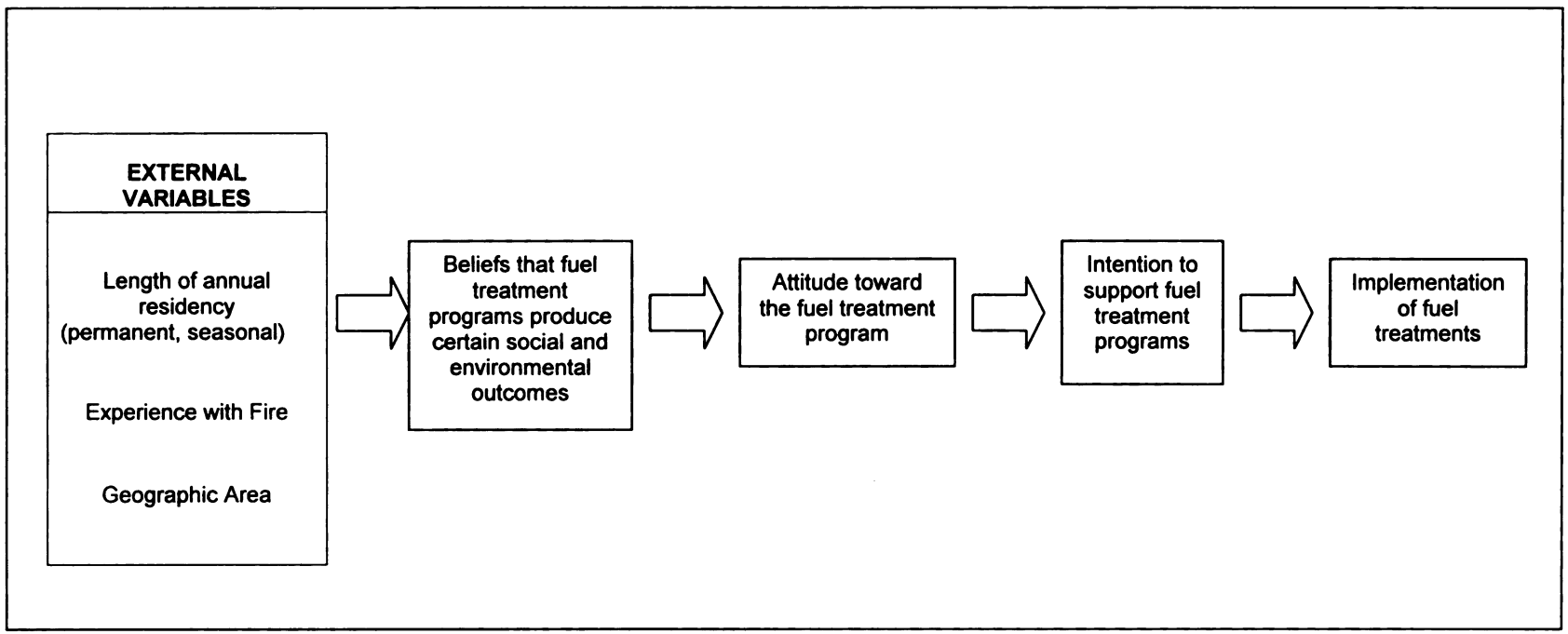

Figure 2. Components of the Theory of Reasoned Action

Beliefs and Attitudes Towards Fuel Treatments

The publics' beliefs and attitudes towards fuel treatments are important in determining the support of fuel treatments. Manfredo et al. (1990) found that the public is divided in its support of prescribed fire policies, including prescribed burning and mechanical removal of flammable vegetation, " . . . [V] iews that areas with a preservation mandate should be managed so that natural processes predominate, and fires are important events instrumental in the dynamic processes that shape wilderness ecosystems" (p. 19). It is suggested that the public is divided in its support of prescribed fire policies in protected areas. Because of the public's divided support for prescribed fire policy, more research is needed to evaluate the public's perception and attitude in regard to fire policy and living in the wildland-urban interface. Public support, for prescribed fire, is important because this fuel treatment is most effective, least expensive, and parallels natural processes (Wilkinson, 2001). Homeowners' perception of fire-related hazards are also important in understanding the support of fuel treatments.

Gardner et al. (1987) in their study of urban homeowners' perceptions of fire hazard found that 67% of the homeowners believed that the wildland fire situation was not serious, with only 6% that perceived the fire situation was very serious in San Bernardino County, California. A majority of urban homeowners believed that fire-related risk due to wildland fires was not serious.

Shindler and Reid (1996) found that respondents to their study strongly supported the use of both prescribed fire and mechanical thinning in the Blue

Mountains, Oregon. The scientists presented several factors that contribute to public acceptance of prescribed fire and mechanical thinning: how a decision influences the local economy, how a practice detracts or contributes to people's understanding of sustainable forestry, the visual quality aspects of management, and how the final management decisions are made. In other words, the way in which the decision making process is conducted and conveyed to the public, in combination with education campaigns, may contribute to the public's acceptance of prescribed fire and mechanical thinning. Whereas, Fried and Winter (2000) found that homeowners were unsupportive of prescribed burning in Crawford County, Michigan. Homeowners were supportive of burning regulations, landscape modification on public land and individual landscape modifications (firewise landscaping). Focus group respondents believed the government was responsible for educating the public about fire danger and making sure that fire plays a role in the decisions concerning the management of public land (Fried & Winter, 2000).

Winter et al. (2002) found that mechanical fuel treatments are the preferred option close to developed areas in Marin County, California, Clay County, Florida, and Oscoda County, Michigan. According to Winter et al. (2002), "Support for fuel management appears to be related to perceived outcomes. Fuel management strategies are 'bad' if they lead to escaped and catastrophic fires, are not cost-effective, result in long-duration smoke events, or reduce the aesthetic quality of surrounding landscapes" (p. 20).

Loomis et al. (2001) found Florida residents were knowledgeable, supportive, and held positive attitudes toward prescribed fire. However, residents indicated that they were not supportive of wildland fire, or uncontrolled fires. According to Loomis et al. (2001), "[Researchers] conclude that introducing educational information makes Florida residents even more knowledgeable and more tolerant of prescribed fire" (p. 22). Education campaigns in Florida appear to raise residents' knowledge and support of prescribed burning, which in turn could translate into the formation of positive attitudes toward fire-related issues.

Several studies have examined the public's support of defensible space. Hodgson (1995) found that four out of five people surveyed in Paradise, California, believed that defensible space would help save their property in the event of a wildfire. According to Hodgson (1995), "For most people, defensible space is perceived to be effective for its intended purposes" (p. 95). Fire prevention works best when it is supported by three key elements: information and education, enforcement, and engineering, and integrated with suppression and fuels management (Hodgson, 1995).

The review of literature indicated that the public may be divided in their support of prescribed fire, mechanical fuel reduction, and defensible space practices. Further research is necessary to understand similarities and differences between seasonal and permanent homeowners in their beliefs and attitudes towards mechanical fuel reduction, defensible space, and prescribed fire.

Intention to Support Fuel Treatments

Closely related to beliefs and attitudes is a person's intention to act. Similarly, Bagozzi and Dabholker (1994) found that, ". . . [I]ntentions are the direct determinants of behavior and are, in turn, influenced by attitudes toward the consequences of acting and felt subjective norms that others whose opinions are valued believe one should act" (p. 318). The person's intention to perform a behavior, such as implementing fuel treatments, depends on the attitude toward performing the behavior, the strength of their belief that performing such behavior will result in reducing the risk to property and or life due to a wildland fire, and the evaluation of those outcomes (Bright et al., 1993). According to Winter et al. (2002), "The most important determinant of a person's behavior is behavioral intent" (p.16). By measuring the public's knowledge, beliefs, and attitudes toward fuel treatments, policy makers and land managers may be able to better manage forests and improve the quality of life for homeowners in the wildland-urban interface.

Summary

If trends and projections by Johnson (2000) are true, then even greater numbers of people will choose to live and build homes adjacent to or within rural natural resource areas. The demographic shift to the wildland-urban interface is projected to increase as more members of the baby boomer generation reach retirement age. As a result, it is expected that residence conversion will cause seasonal homes to be transformed into permanent homes. Homeowners may find themselves strongly encouraged or required to reduce the risk of losing

property and/or life by using fuel treatments. It is clear that fuel treatments are multi-dimensional in their effects on homeowners' perception of risk associated with wildland fire. The decision to implement fuel treatments has shown to be based on the homeowners' beliefs, attitudes, and support of fire management and fuel hazard mitigation programs. For homeowners to support fuel treatments, they must perceive that such measures produce certain outcomes, such as minimizing fire-related risks. If seasonal and permanent homeowners understand the risks associated with living in the wildland-urban interface, it is expected that homeowners would not differ in their perceived level of risk toward wildland fire.

Hypotheses

The review of literature facilitated a better understanding of homeowners' beliefs, and attitudes toward fire-related issues and the formation of hypotheses. Based on the review of literature, it was clear that a study examining perceived risk of wildland fire and the acceptability of fuel treatments had not been conducted that segments homeowners by seasonal and permanent residency length. Given that no existing research suggests these homeowner groups might be different, a null hypothesis approach has been taken. Therefore across fuel treatment types (prescribed burning, mechanical fuel reduction, and defensible space) and study sites it was postulated that seasonal and permanent homeowners would be similar despite the differences in time spent in the local area, as well as potential investment in their home and land.

The following null hypotheses were tested in this study:

H1: Seasonal and permanent homeowners will not differ in the extent to which fuel treatments have been implemented on their property.

H2: Seasonal and permanent homeowners will not differ in their perceived level of risk toward wildfire.

H3: Seasonal and permanent homeowners will not differ in their beliefs, attitudes, and support of fire management as exercised with fuel treatments.

CHAPTER 3

METHODS

Introduction

The problem of the study was to identify similarities and differences between seasonal and permanent homeowners in respect to beliefs and attitudes towards fuel treatments, intentions to support such treatments, and fire safe behaviors. The structure of this methods section includes the following: (1) selection of study sites, (2) selection of the population, (3) procedures of collecting data, (4) measurement and scales, (5) data analysis, (6) instrument and response rates, (7) testing of non-response bias, and (8) description of participants.

Selection of Study Sites

Since the study focused on fuel treatments within specific geographic regions, five National Forests were selected to represent different communities and forest types. A national registry of communities at risk was reviewed to facilitate the selection process. Study sites included San Bernardino National Forest, California; Grand Mesa, Uncompahgre and Gunnison National Forests/Bureau of Land Management (BLM) land, Colorado; and Apalachicola National Forest, Florida. The first study site, San Bernardino National Forest was selected because of the forest's relative close proximity to the major metropolitan areas of San Bernardino and Los Angeles, CA (Figure 3). San Bernardino National Forest provides homeowners of these cities opportunities for recreation and locations for vacation homes. Adjacent to San Bernardino National Forest

are several communities dependent on the forest for economic vitality through tourism, skiing, boating, and other related recreational activities. The blend of homeownership adjacent to and within the forest defines this area as the wildland-urban interface.

Two communities in the San Bernardino National Forest, Sugarloaf and Running Springs, reflect different residency types, economic status, community firewise education programs, and relative threat posed by wildland fire. Through meetings with USDA Forest Service Fire Management Officers, Sugarloaf and Running Springs were selected to demonstrate the acceptance of fuel management practices by homeowners. Historically, the community of Sugarloaf was designated as a series of private campground plots which were located close to Big Bear Lake that provided access for water-related recreation. At a later date vacation cabins were built on these private landholdings. Today, Sugarloaf represents a community characterized by many seasonal homes and few permanent homes, closely spaced cabins, and older structures constructed with fire prone building materials in close proximity to the forest.

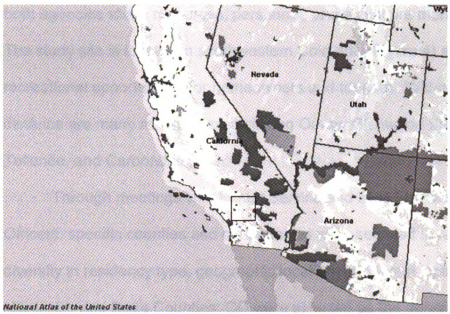

Figure 3. Location of San Bernardino National Forest, California.

Running Springs was selected because of its location between two major resort towns, Big Bear Lake and Lake Arrowhead. This community is characterized by a close to equal ratio of seasonal (51%) to permanent (49%) homeowners, high diversity in residence type and size, and close proximity to the forest and flammable vegetation (Census 2000). Running Springs also has a firewise education program which Sugarloaf does not.

The second study site, Grand Mesa, Uncompahgre and Gunnison National Forests, was selected based on its different ecosystems diverse communities. Outside National Forest boundaries is land managed by the BLM. Because of these mosaic-like land management boundaries, both USFS and BLM managed land was included in the study site. These agencies cooperate in managing what is collectively termed the Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG). It is because of this unique partnership that

both agencies share resources, personnel, and a joint fire management plan. The study site is located in southwestern Colorado (Figure 4) and provides many recreational opportunities for homeowners and tourists. Within close driving distance are many resort towns including Ouray, Glenwood Springs, Aspen, Telluride, and Carbondale, CO.

Through meetings with Forest Service and BLM Fire Management Officers, specific counties and communities were selected to represent the diversity in residency type, geographic location, and forest types. Ouray, Montrose, and Delta Counties, CO were selected as the general areas (Figure 4). Next, specific areas in these counties were selected. Sims Mesa, within Delta County, was selected due to previous prescribed fire campaigns that took place on BLM managed land. Log Hill Mesa, a

Figure 4. Location of Grand Mesa, Uncompahgre and Gunnison National Forests (GMUG), Colorado.

newly developed community within Ouray County, was selected because of its proximity to the National Forest and recent use of mechanical fuel treatments. Additional areas determined to be wildland-urban interface in all three counties were suggested by local fire managers. In sum, residency areas were characterized as having a mix of seasonal and permanent homeowners with high fire danger with different types and sizes of homes.

The final study site, Apalachicola National Forest, was selected as a study site due to its diverse communities, relatively high fire danger, and managed use of fire within the forest ecosystems. Located within the panhandle of the state of Florida, the study site is adjacent to the city of Tallahassee (Figure 5). Due to the forest's close proximity to a major metropolitan area, the study site was considered to be representative of the wildland-urban interface.

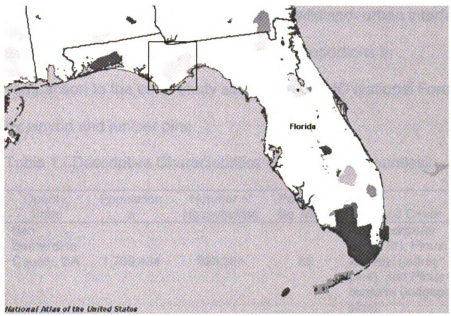

Figure 5. Location of Apalachicola National Forest, Florida.

Based on recommendations by USFS Fire Management Officers, communities within Leon, Liberty, and Wakulla Counties were selected. These communities included Crawfordville, Sopchoppy, and Tallahassee. These communities are characterized as having diverse residency types, high seasonal fire danger, and homeowners who are familiar with prescribed fire.

To better understand selected counties a brief description of each county is found in Table 1. Since the major metropolitan area of Tallahassee is located in Leon County, Florida, this wildland-urban interface region had the highest proportion of people per square mile (359). This wildland-urban interface is dominated by slash and longleaf pine. The major metropolitan area of San Bernardino is located in California's largest county and averages 85 people per square mile. The forest is composed primarily of white fir, jeffrey pine, and lodgepole pine. Overall, in the Colorado wildland- urban interface areas studied, all counties had relatively low population proportions in comparison to the other study sites. The GMUG National Forests are dominated by pinyon and juniper pine.

Table 1. Descriptive Characteristics of Study Site Counties

County, State	Population a	Number of Householdsb	Persons/ Sq. Milec	Land Cover	Land Management
San Bernardino County, CA	1,709,434	528,594	85	*Abies concolor* (white fir), *Pinus jeffereyi* (jeffrey pine), and *Pinus contorta* (lodgepole pine)	USDA Forest Service
Delta County, CO	27,834	11,058	24	Pinus 'edulis (pinyon pine) and *Juniperus scopulorum* (juniper pine)	USDA Forest Service, USDI BLM
Montrose County,				Pinus 'edulis (pinyon pine) and	USDA Forest Service,

CO	33,432	13,043	15	*Juniperus scopulorum* (juniper pine)	USDI BLM
Ouray County, CO	3,742	1,576	7	Pinus 'edulis (pinyon pine) and *Juniperus scopulorum* (juniper pine)	USDA Forest Service, USDI BLM
Wakulla County, FL	22,863	8,450	38	*Pinus elliottii* (slash pine) and *Pinus palustris* (longleaf pine)	USDA Forest Service
Leon County, FL	239,452	96,521	359	*Pinus elliottii* (slash pine) and *Pinus palustris* (longleaf pine)	USDA Forest Service
Liberty County, FL	7,021	2,222	8	*Pinus elliottii* (slash pine) and *Pinus palustris* (longleaf pine)	USDA Forest Service

aTotal county population (Census 2000)
bTotal housing units (Census 2000)
cTotal persons per square mile (Census 2000)

Selection of the Population

This study used a sample of 1,000 households from each of the three study sites, proportionally stratified by seasonal and permanent homeowners (Table 2). Because of a sorting error with the homeowners' list provided by the tax assessor's office, 219 households were removed from the Colorado sample, bringing the total sample size to 781 Colorado households. Study site samples were randomly drawn from populations based on both the 2000 U.S. Census and county tax assessor data. Permanent homeowners were defined as residents with the same permanent address

Table 2. Study Sampling Frame

Study Site, Residency Type	Population	% of Population	Sample	% of State Sample
California, Seasonal	3,565	64%	638	64%
California, Permanent	1,966	36	362	36
Colorado, Seasonal	377	28%	215	28%
Colorado, Permanent	955	72	566	72

Florida, Seasonal	306	12%	289	29%
Florida, Permanent	2,219	88	711	71

as their actual home address; whereas, seasonal homeowners were defined as residents where their permanent address was different than their seasonal address. Because the Tallahassee area's seasonal population was low (12%) in comparison to the permanent population (88%), the seasonal population was over sampled to provide a sufficient subsample (29% of the sample).

To identify respondents for the mail survey, county tax assessor offices at all study sites were contacted during site visits to: (1) gather names and addresses, and (2) ensure that the sample to which the mail surveys were sent was proportional to the number of seasonal and permanent homeowners for each county.

Procedures of Collecting Data

A self-administered mail survey (Appendix A), a cover letter (Appendix B), a postage paid, and pre-addressed return envelope was mailed to randomly selected homeowners from county tax assessor records, following a modified Dillman mail procedure (Dillman, 1978). In the cover letter, each homeowner selected was asked to complete the questionnaire and mail it back in the enclosed postage paid, pre-addressed return envelope. In return for their time and effort, respondents were entered into a drawing that consisted of four $25.00 gift certificates for each study site. Because of the proximity of Walmart to homeowners in California and Colorado, eight gift certificates were purchased and mailed to the selected recipients. A total of four recipients in Florida

received similar gift certificates to Lowe's Home Improvement Center. The winners were randomly drawn from the full sample. Ten days after the initial mailing was sent, reminder postcards (Appendix C) were mailed to all potential respondents. As a final effort to increase response rates, a second cover letter (Appendix D), questionnaire, and a postage paid, pre-addressed return envelope were mailed to those prospective respondents who had not yet returned the questionnaire.

Measurement and Scales

Four sections of the mail survey instrument (Appendix A) were used for this thesis: (1) past experiences with and actions involving wildland fire, (2) wildland fire risk perceptions, (3) beliefs, attitudes, and intentions to support wildland fire and fuel management, and (4) demographic characteristics.

The first section of questions concerned respondents' past experiences with and actions involving wildland fire. Two questions in total contained 24 items. Respondents were asked to check all that applied (Table 3).

The second section of questions were about respondents' risk perceptions of wildland fire and fuel management and were measured with two sets of scales. The first scale consisted of a set of four, seven-point Likert-type scales that evaluated the level of concern held by seasonal and permanent homeowners toward wildland fire. A second Likert-type scale was utilized to determine whether homeowners' behavior toward fuel treatment programs would reduce their risk of losing their home due to a wildland fire.

Table 3. Operationalization and Measurement of Study Constructs

Constructs	Measurement (with question number referenced)	Author
Experience with fire	Determine respondents' experience with fire, fuel treatments, or the residual effects of firea (q. 16)	Fried et al. (1999)
Actions involving fuel treatments	Determine actions taken by homeowners due to a fire or fire preventionb (q. 17)	Fried et al. (1999)
Current perceived risk of fire	Determine the level of concern, in regards to wildfire, held by homeownersc (q. 13)	Winter, P.
Perceived effectiveness of one's own efforts	Determine respondent's behavior toward fuel treatment programsd (q, 18)	Vogt & Cindrity
Belief outcomes for fuel treatment	Belief that prescribed fire produces certain outcomese (q. 20)	Fried et al. (1999)
Belief outcomes for fuel treatment	Belief that mechanical fuel reduction will produces certain outcomesf (q. 21)	Fried et al. (1999)
Belief outcomes for fuel treatment	Belief that defensible space will produce certain outcomesg (q. 22)	Fried et al. (1999)
Current attitude toward fuel treatment	Determine respondent's attitude toward fuel treatmentsh (q. 15)	Fried et al. (1999)
Approval of fuel treatments	Determine respondents' approval of fuel treatmentsi (q. 23)	Fried et al. (1999)

aEvaluated with a dichotomous, check-box format
bEvaluated with a dichotomous, check-box format
cEvaluated on a seven-point Likert-type scale that ranged from 0 ("not at all concerned") to 6 ("very concerned")
dEvaluated on a seven-point Likert-type scale that ranged from 0 ("no") to 6 ("absolutely")
eEvaluated on a seven-point Likert-type scale that ranged from 0 ("zero likelihood") to 6 ("certain")
fEvaluated on a seven-point Likert-type scale that ranged from 0 ("zero likelihood") to 6 ("certain")
gEvaluated on a seven-point Likert-type scale that ranged from 0 ("zero likelihood") to 6 ("certain")
hEvaluated on a seven-point Likert-type scale that ranged from -3 ("extremely negative") to 3 ("extremely positive")
iEvaluated on a seven-point Likert-type scale that ranged from -3 ("strongly disapprove") to 3 ("strongly approve")

The third section of questions were about respondents' belief strength and attitude toward fuel treatments and were measured with five sets of scales. The first three sets of scales consisted of a set of six, seven-point Likert-type scales that evaluated respondents' beliefs that prescribed burning, mechanical fuel reduction, and defensible space would produce certain outcomes. The second scale consisted of a set of three, seven-point Likert-type scales that measured respondents' attitude toward prescribed burning, mechanical fuel reduction, and

defensible space. The third scale consisted of a set of three, seven-point Likert-type scales that measured respondents' approval of prescribed burning, mechanical fuel reduction, and defensible space.

Demographic questions comprise the fourth section of the mail survey instrument. Respondents in this section were asked to indicate: gender, employment status, job description, type of area where they have lived most of their life, respiratory breathing problems, if their area is served by a fire department, highest education level obtained, and their total 2000 household income.

Data Analysis

To analyze the collected data systematically, researchers entered each questionnaire using the Statistical Program for the Social Sciences (SPSS), version 10.0. Respondents were stratified first by state and then by the two residency groups, seasonal and permanent homeowners. Final residency classification was determined based on the respondent's classification of their residency.

To test the first hypotheses, nominal data from both the dependent variables of past experiences and actions with wildland fire were analyzed using chi-squares to determine possible differences between the seasonal and permanent groups.

To test hypotheses two and three, independent sample two-tailed t-tests were used to compare seasonal and permanent homeowners' responses. The t-test procedure assumes that there are two samples (or groups) being compared

and that the samples are independent, and the dependent variable is represented in interval or ratio data (Sirkin, 1999). To ensure that the samples were independent, only responses where homeowners were their residential status as either permanent or seasonal were included. The t-test procedure uses analysis of variance to compare the means for the two groups of cases and to statistically analyze the relationship between the variables (Sirkin, 1999). In terms of sample sizes, much more confidence may be enlisted with larger sample sizes since it is closer to the true value than estimate based on the smaller sample size (Sirkin, 1999). A p-value of .05 level was used to evaluate significant differences between seasonal and permanent homeowners. According to Sirkin (1999), if smaller sample sizes were reported a p-value of .10 would be recommended.

Instrument Design and Response Rates

Initially, focus groups and/or interviews were planned for at all three site visits to understand the constructs to be studied. Two focus groups were conducted in California on July 24, 2002. The first focus group was composed of Forest Service personnel, local government and fire department officials. That evening a second focus group was conducted with resident volunteers from the Mountaintop District Fire Safe Council, Arrowbear. A focus group, held on September 10, 2002, in Colorado included Forest Service personnel and Red Cross volunteers and was followed by informal interviews with local homeowners. A third focus group was held during October in Florida and included Forest Service personnel. Focus groups and interviews helped in the

understanding of local residents. Professional perspectives towards fuel treatments to aid in the development of the mail survey instrument. Several researchers at Michigan State University and a researcher in the USDA Forest Service reviewed the mail survey. Once the questionnaire was finalized, mailings for each state were prepared.

The first wave of mailings for the California and Colorado samples occurred on November 5, 2001, followed by a reminder postcard eight days later. The second wave of mailings occurred approximately two weeks following the reminder postcard. Due to a delay with county tax assessors, Florida's first wave of mailings was sent on November 30, 2001, followed by a reminder postcard eight days later. The second wave of mailings occurred approximately two weeks after the reminder postcard. In terms of the second mailing, California and Colorado mailings were sent November 30, 2001, followed by Florida on January 7, 2002.

Because of the sorting error, bad addresses, and returned mail, the total effective sample included 2,500 households. Bad addresses included returned mail where the homeowner either moved and did not forward their existing mail service or the forwarding service had expired. The effective sample size is presented in Table 4. Of the 2,500 mail surveys sent which were viable, 939 were returned in the postage-paid reply envelopes (Table 5). The results of the mail survey are presented in Table 5. A total response rate of 38% was achieved. Due to the events of September 11 and the anthrax mail scare, special precautions were utilized to increase participation in the study. These

included a personalized cover letter, press releases, and incentives, which included a random drawing of $25.00 gift certificates to Walmart, in California and Colorado, and Lowe's Home Improvement Center in Florida.

Testing of Non-Response Bias

Given the response rate of 38 percent, a check for non-response bias was completed. To examine non-response bias selected demographics of permanent homeowner respondents were compared and contrasted to the available Census data (1990), including educational level, household income, and gender. Respondents to the mail survey are a representative, stratified random sample of selected wildland-urban interface study areas, not necessarily the entire county as reported by the

Table 4. Effective Household Sample Size

Study Site, Residency Type	Sample	Bad Addresses	Effective Sample
California, Seasonal	638	117	521
California, Permanent	362	74	288
Colorado, Seasonal	215	14	201
Colorado, Permanent	566	20	546
Florida, Seasonal	289	23	266
Florida, Permanent	711	33	678
Total	2,781	281	2,500

Table 5. Mail Survey Response Rates

Study Site, Residency Type	Number Respondents	Response Rate
California, Seasonal	176	34%
California, Permanent	119	41
Colorado, Seasonal	66	33
Colorado, Permanent	254	47
Florida, Seasonal	57	21
Florida, Permanent	267	39
Total	939	38

Census. Thus, some differences are expected between the population and the sample. Additionally, question responses differed slightly from the questionnaire to the census questions. Every attempt has been made to create categories that are compatible.

On education, respondents were asked to indicate the highest level of education they had obtained. In Table 6, these data were compared to the 1990 county population data to determine differences between the sample and population (U.S. Census Bureau 1990). Sample distributions were modified slightly to facilitate this comparison to Census data. The study sample appears to have a higher level of education than the general population. In the seven counties studied, five counties had a greater portion of the residents completing graduate or professional degrees.

Table 6. Non-Response Analysis on Educational Levela

Level of Education	Sample %b	Population %
San Bernardino County, CA	n=119	
Less than 9th grade	1%	9%
9th to 12th, no diploma	1	16
High school graduate	14	27
Some college, no degree	12	25
Associates degree	21	8
Bachelor's degree	18	10
Graduate or professional degree	17	5
Delta County, CO	n=99	
Less than 9th grade	3	11
9th to 12th, no diploma	3	16
High school graduate	25	40
Some college, no degree	2	17
Associates degree	8	6
Bachelor's degree	27	8
Graduate or professional degree	21	2
Montrose County, CO	n=48	
Less than 9th grade	0	10
9th to 12th, no diploma	0	15
High school graduate	22	35
Some college, no degree	15	19

Associates degree	18	5
Bachelor's degree	3	10
Graduate or professional degree	18	6
Ouray County, CO	n=173	
Less than 9th grade	1	5
9th to 12th, no diploma	1	8
High school graduate	15	32
Some college, no degree	7	23
Associates degree	11	4
Bachelor's degree	23	17
Graduate or professional degree	30	11
Wakulla County, FL	n=154	
Less than 9th grade	0	11
9th to 12th, no diploma	5	17
High school graduate	39	39
Associates degree	10	4
Bachelor's degree	17	6
Graduate or professional degree	9	5
Leon County, FL	n=139	
Less than 9th grade	2	5
9th to 12th, no diploma	3	10
High school graduate	37	22
Some college, no degree	8	19
Associates degree	9	8
Bachelor's degree	18	21
Graduate or professional degree	10	15
Liberty County, FL	n=29	
Less than 9th grade	0	18
9th to 12th, no diploma	12	25
High school graduate	41	33
Some college, no degree	12	13
Associates degree	18	4
Bachelor's degree	12	5
Graduate or professional degree	0	2

Table 6. Continued

aSample education categories modified to facilitate the comparison to census data
bOnly permanent homeowner respondents were compared to Census 1990 data

On household income, respondents were asked to indicate their 2000 annual household income from all sources before state and federal taxes. The study sample appears to have higher income levels than the general population (Table 7). In all seven of the counties studied, a higher proportion of respondents compared to the population indicated their total household income as "$80,000 or more."

On the final non-response bias check, gender was examined. Respondents were asked to indicate their gender with a dichotomous, check-box format. Respondents from San Bernardino County had the closest resemblance to the population with 52 percent male and 48 percent female (Table 8). The Colorado sample was significantly higher in male respondents, particularly Delta County, CO.

These results suggest that across all three study sites, respondents were better educated, reported higher income levels, and were primarily male in comparison to the general population of homeowners in that county.

Description of Respondents

Given homeowners were studied, we would expect households with higher levels of income and possibly higher education levels. Thus a bias toward higher educated and higher income males exist in our analysis and should be considered when interpreting the results. In California, a majority (98%) of seasonal respondents lived

Table 7. Non-Response Analysis on Annual Household Income

Household Incomea	Sample %	Population %
San Bernardino County, CA		
Less than $20,000	7%	29%
$20,000 to $39,999	21	30
$40,000 to $59,999	22	20
$60,000 to $79,999	21	12
$80,000 or more	29	9
Delta County, CO		
Less than $20,000	17	52
$20,000 to $39,999	28	32
$40,000 to $59,999	32	10
$60,000 to $79,999	10	4
$80,000 or more	13	2
Montrose County, CO		
Less than $20,000	6	43

$20,000 to $39,999	17	33
$40,000 to $59,999	34	14
$60,000 to $79,999	23	6
$80,000 or more	20	4
Ouray County, CO		
Less than $20,000	5	34
$20,000 to $39,999	18	38
$40,000 to $59,999	26	16
$60,000 to $79,999	20	7
$80,000 or more	31	5
Wakulla County, FL		
Less than $20,000	8	39
$20,000 to $39,999	22	34
$40,000 to $59,999	31	17
$60,000 to $79,999	19	7
$80,000 or more	20	3
Leon County, FL		
Less than $20,000	6	37
$20,000 to $39,999	23	30
$40,000 to $59,999	26	16
$60,000 to $79,999	23	10
$80,000 or more	22	7
Liberty County, FL		
Less than $20,000	7	45
$20,000 to $39,999	50	33
$40,000 to $59,999	14	14
$60,000 to $79,999	21	6
$80,000 or more	8	2

aSurvey categories modified to match Census 1990 data

Table 8. Non-Response Analysis on Gender

Gender	Sample %	Population %
San Bernardino County, CA		
Male	52%	50%
Female	48	50
Delta County, CO		
Male	84	50
Female	16	50
Montrose County, CO		
Male	65	49
Female	35	51
Ouray County, CO		
Male	75	51
Female	25	49
Wakulla County, FL		
Male	68	52
Female	32	48
Leon County, FL		
Male	74	48
Female	26	52

Liberty County, FL		
Male	63	60
Female	37	40

within the state. The other states where seasonal respondents originated from included Nevada (1%) and Colorado (1%). In Colorado, 46% of seasonal respondents indicated they lived within the state. Additional seasonal respondents originated from California (14%), Texas (8%), Florida (6%), and 14 other states throughout the United States. A majority (60%) of Florida's seasonal respondents lived within the state. Additional seasonal respondents originated from Georgia (23%), Alabama (9%), California (4%), Louisiana (2%), and Texas (2%). Given that seasonal homeowners often lived in the same state where their permanent home was located, awareness of the risks associated with wildland fire may be similar between permanent and seasonal homeowners.

On employment status of respondents, across all three study sites a majority of homeowners were self-employed or retired (Appendix E). In California, 51 percent of both seasonal and permanent homeowners indicated they were either self-employed or retired; whereas, in Colorado slightly more permanent homeowners (60%) in comparison to seasonal homeowners (56%) indicated they were retired or self-employed. More Florida seasonal homeowners (55%) compared to permanent homeowners (45%) being self-employed or retired. In California, both seasonal and permanent homeowners indicated equally (7%) they were employed in the health or medical field. Twenty percent of seasonal homeowners reported they were employed in education as compared to permanent homeowners (14%). Retail, manufacturing, and

tourism/recreation ranked high as career types for California respondents. In Colorado, 16 percent of seasonal homeowners indicated they were employed in the health or medical profession as compared to permanent homeowners (11%). Education, retail, agriculture, and manufacturing also ranked high as career types with Colorado respondents. In Florida, 22 percent of seasonal homeowners were employed in retail as compared to permanent homeowners (18%). The largest proportion of Florida respondents reported education, the health or medical field, and manufacturing as their type of employment.

Summary

This chapter presented the methods employed for the analysis of the data including the selection of study sites, selection of the population, procedures of collecting data, measurement and scales, and description of participants. The chapter that follows provides the results of the study, an analysis of those results, and the results of the hypothesis test.

CHAPTER 4

RESULTS

Evaluating the similarities and differences between seasonal and permanent homeowners in a geographic area might provide a better understanding of their perception and support of fuel hazard mitigation programs. The data presented below are expected to provide fire management officers, land managers, and policy makers with valuable information on the beliefs, attitudes, and intentions of homeowners to support fuel treatment programs that are intended to reduce property and life loses.

Results are presented in this chapter according to the following topics: (1) homeowners' experience with fire, (2) homeowners' actions of becoming educated or involved with fire prevention, (3) level of concern toward fire-related risk held by homeowners, (4) homeowners' compliance toward fuel treatments, (5) homeowners' beliefs that fuel treatments produce certain outcomes, (6) homeowners' attitude toward fuel treatments, and (7) homeowners' intent to support fuel treatments. For all topics, each study site (i.e. state) is presented separately with statistical testing occurring between residency types only. Since residency sample proportions were not equal, cross state comparisons were not possible. As a result, similarities and differences between seasonal and permanent homeowners are reported for each study site.

These eight topics will answer the hypotheses for the three study sites. The chi-square statistic compares independent observations (i.e., nominal data)

and is useful in testing the null hypothesis. The t-test procedure uses analysis of variance to compare the interval data (i.e., Likert scale) for the two groups of cases and to statistically analyze the relationship between the variables (Sirkin, 1999). These statistical tests facilitate an understanding of statistically significant differences between seasonal and permanent homeowners in their compliance towards fuel mitigation regimes, perceived level of risk toward wildland fire; and beliefs, attitudes and support of fire management exercised with fuel treatments.

Homeowners' Experience with Fire

Table 9 describes the level of fire-related experiences by homeowners. In the California wildland-urban interface areas studied, permanent homeowners had a significantly greater variety of fire-related experiences than seasonal homeowners. Permanent homeowners indicated that they experienced higher levels of wildland fire-related smoke (82%), observed a higher frequency wildland fires (80%), and personally witnessed more road closures (77%) as compared to seasonal homeowners. Permanent homeowners also experienced higher levels of anxiety due to wildland fires (57%) and discomfort or health problems from smoke (19%). In terms of protecting their homes, permanent homeowners (68%) were more likely to implement a defensible space around their residence as compared to seasonal homeowners (52%). Few seasonal or permanent homeowners were personally injured by wildland fires.

In the Colorado wildland-urban interface areas studied, permanent and seasonal homeowners had similar fire-related experiences (Table 9). Permanent and seasonal homeowners experienced high levels of smoke, witnessed wildland fires, and were likely to implement a defensible space around their residence. A similar proportion of seasonal (26%) and permanent (27%) homeowners indicated that a mechanical removal of trees had occurred near their residence. Both permanent and seasonal homeowners had experienced an equal amount of road closures (26%) and suffered

Table 9. Fire-Related Experiences

Outcome/Evaluation	Permanent Homeowner	Seasonal Homeowner	X2
California			
Experienced smoke from a wildland fire	82%	45%	41.48***
Personally witnessed a wildland fire	80	56	17.37***
Experienced a road closure due to a wildland fire	77	44	31.63***
Been required to remove flammable vegetation on my property	67	69	.099
Implemented a defensible space around my residence	68	52	7.76**
Felt fear or anxiety as a result of a wildland fire	57	35	13.98***
A prescribed burn has occurred near my home	45	8	55.26***
Friends, family or neighbors suffered property damage from a wildland fire	29	10	16.08***
A mechanical removal of trees has occurred near my home	23	22	.003
Experienced discomfort or health problems from smoke caused by a wildland fire	19	9	5.40*
Suffered property damage from a wildland fire	5	1	16.08***
Been personally injured by a wildland fire	3	1	n/a
Colorado			
Experienced smoke from a wildland fire	69%	61%	1.69
Personally witnessed a wildland fire	64	55	1.77
Implemented a defensible space around my residence	45	40	1.32
A mechanical removal of trees has occurred near my home	27	26	.070
Felt fear or anxiety as a result of a wildland fire	27	24	.263
Experienced a road closure due to a wildland fire	26	26	.005
Friends, family or neighbors suffered property damage from a wildland fire	20	12	2.28
A prescribed burn has occurred near my home	18	15	.268

Experienced discomfort or health problems from smoke caused by a wildland fire	14	12	.005
Been required to remove flammable vegetation on my property	12	9	.524
Suffered property damage from a wildland fire	5	5	n/a
Been personally injured by a wildland fire	2	0	n/a
Florida			
Experienced smoke from a wildland fire	80%	83%	.236
Personally witnessed a wildland fire	63	70	1.04
A prescribed burn has occurred near my home	69	65	.306
Experienced a road closure due to a wildland fire	42	46	.324
Felt fear or anxiety as a result of a wildland fire	28	33	.668
A mechanical removal of trees has occurred near my home	28	28	.001
Implemented a defensible space around my residence	23	26	.220
Experienced discomfort or health problems from smoke caused by a wildland fire	26	21	.533
Friends, family or neighbors suffered property damage from a wildland fire	13	25	5.08*
Suffered property damage from a wildland fire	5	5	n/a
Been required to remove flammable vegetation on my property	3	5	n/a
Been personally injured by a wildland fire	1	7	n/a

*p<.05 or ** p<.01 or *** p<.001; n/a cells have expected count less than 5 respondents.

equal property damage from wildland fires (5%). Few seasonal or permanent homeowners were personally injured by wildland fires.

In the Florida wildland-urban interface areas studied, seasonal and permanent homeowners had similar fire-related experiences (Table 9). In only one type of experience did seasonal homeowners have a significantly higher level of friends, family of neighbors who suffered property damage from a wildland fire as compared to permanent homeowners. Both seasonal and permanent homeowners had suffered equal property damage from wildland fires (5%) and, similarly, observed a mechanical removal of trees near their home (28%). Few seasonal and permanent homeowners were personally injured by wildland fires.

Homeowners' Actions of Becoming Educated or Involved with Fire Prevention

Table 10 describes homeowners' actions of becoming educated or involved with fire prevention. In the California wildland-urban interface areas studied, permanent homeowners had completed a significantly greater variety of fire-related actions than seasonal homeowners. Permanent homeowners indicated they had observed more effects of wildland fires on forests, experienced a greater number of home or office evacuations due to wildland fires, and observed a higher frequency of neighbors being careless with fire than seasonal homeowners. Permanent homeowners also attended more interpretive programs and public meetings about wildland fire in comparison to seasonal homeowners. In the California wildland-urban interface areas studied, permanent homeowners were more likely to ask local fire departments how to reduce the risk of property damage caused by a wildland fire as compared to seasonal homeowners.

Table 10. Fire-Related Actions

Outcome/Evaluation	Permanent Homeowner	Seasonal Homeowner	X^2
California			
Observed effects of wildland fires on forests	85%	68%	10.89***
Read information on home protection from wildland fires	74	70	.512
Evacuated my home or office due to wildland fire	43	10	43.41***
Observed neighbors being careless with fire	39	23	8.36**
Attended a park or forest interpretive program about wildland fire	34	10	25.64***
Attended a public meeting about wildland fire	34	7	34.55***
Worked with wildland fires as part of my job or as a volunteer	19	7	9.25**
Worked with local fire department on neighborhood and community fire protection	19	6	11.79***
Asked local fire department about how to reduce risk of property damage from wildland fire	13	6	5.17*
Asked forest rangers how to reduce risk of property damage caused by wildland fire	12	3	9.21**

Colorado			
Observed effects of wildland fires on forests	75%	62%	4.25*
Read information on home protection from wildland fires	72	70	.164
Observed neighbors being careless with fire	49	39	2.02
Worked with local fire department on neighborhood and community fire protection	29	26	.333
Worked with wildland fires as part of my job or as a volunteer	29	17	3.84*
Asked local fire department about how to reduce risk of property damage from wildland fire	18	18	.000
Attended a public meeting about wildland fire	18	15	.209
Attended a park or forest interpretive program about wildland fire	14	17	.235
Asked forest rangers how to reduce risk of property damage caused by wildland fire	7	9	.284
Evacuated my home or office due to wildland fire	5	2	n/a
Florida			
Observed effects of wildland fires on forests	70%	72%	.101
Observed neighbors being careless with fire	48	51	.164
Read information on home protection from wildland fires	37	42	.448
Worked with wildland fires as part of my job or as a volunteer	18	14	.454
Worked with local fire department on neighborhood and community fire protection	14	16	.128
Asked local fire department about how to reduce risk of property damage from wildland fire	5	14	5.59**
Attended a park or forest interpretive program about wildland fire	9	12	.560
Asked forest rangers how to reduce risk of property damage caused by wildland fire	6	9	.409
Attended a public meeting about wildland fire	5	9	1.01
Evacuated my home or office due to wildland fire	2	5	n/a

*p<.05 or ** p<.01 or *** p<.001; n/a cells have expected count less than 5 respondents.

In the Colorado wildland-urban interface areas studied, significantly more permanent homeowners indicated they had observed more effects of wildland fires on forests as compared to seasonal homeowners (Table 10). More permanent homeowners worked with wildland fires as part of their job or as a volunteer as compared to seasonal homeowners. Both seasonal and permanent homeowners equally indicated that they asked local fire

departments how to reduce the risk of property damage from wildland fire (18%). Few seasonal and permanent homeowners were required to evacuate their home or office due to wildland fires.

In the Florida wildland-urban interface areas studied, seasonal homeowners were more likely to ask local fire departments about how to reduce the risk of property damage from a wildland fire as compared to permanent homeowners (Table 10). Seasonal and permanent homeowners were similar in their actions of observing the effects of wildland fires on forests, reading information on home protection, and working with local fire departments on neighborhood and community fire protection. Few seasonal and permanent homeowners were required to evacuate their home or office due to wildland fires.

Level of Concern Toward Fire-Related Risk Held by Homeowners

In the California wildland-urban interface areas studied, the results of the t-tests for level of concern held by homeowners (Table 11) indicate no significant variation between seasonal and permanent homeowners. In total, permanent (mean = 4.61) and seasonal (mean = 4.29) homeowners reported high levels of concern toward wildland fires in California. Permanent (mean = 4.63) and seasonal (mean = 4.51) homeowners' greatest concern was the possibility of losing their home, and possibly life, from a

Table 11. Level of Concern Held by Homeowners

Outcome/Evaluation	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Wildland fires resulting in loss of your home and	4.63	.16	4.51	.14	-.606	.54

possibly life						
Wildland fires in California	4.61	.14	4.29	.12	-1.736	.08
The level of attention by neighbors in regard to wildland fires	4.30	.15	3.94	.13	-1.802	.07
The level of attention by tourists/campers in regard to wildland fires	4.29	.20	4.28	.14	-.012	.99
Colorado	n=254		n=66			
Wildland fires in Colorado	4.57	.09	4.55	.18	-.114	.91
The level of attention by tourists/campers in regard to wildland fires	4.40	.11	4.16	.20	-.968	.33
Wildland fires resulting in loss of your home and possibly life	4.11	.12	4.20	.26	.321	.74
The level of attention by neighbors in regard to wildland fires	4.00	.11	4.09	.21	.375	.70
Florida	n=267		n=57			
Wildland fires in Florida	4.29	.11	4.18	.25	-.437	.66
The level of attention by tourists/campers in regard to wildland fires	3.99	.13	3.85	.25	-.466	.64
Wildland fires resulting in loss of your home and possibly life	3.74	.14	4.14	.30	1.213	.22
The level of attention by neighbors in regard to wildland fires	3.55	.13	3.96	.25	1.352	.17

aScale ranged from 0 to 6 where 0 represented homeowners were not at all concerned to 6 where homeowners were very concerned.

wildland fire. No significant statistical difference was reported between seasonal and permanent homeowners.

In the Colorado wildland-urban interface areas studied, the results of the t-tests for level of concern held by homeowners indicate no variation between means for seasonal and permanent homeowners (Table 11). Permanent (mean = 4.57) and seasonal (mean = 4.55) homeowners were most concerned with wildland fires in Colorado. Permanent homeowners (mean = 4.40) were also concerned about the level of attention tourists and campers in regard to

wildland fires. There was no significant statistical difference between the two types of homeowners in their level of concern towards wildland fire.

In the Florida wildland-urban interface areas studied, homeowners were most concerned about wildland fires in their state (Table 11). Seasonal homeowners were also quite concerned with wildland fires that could potentially result in the loss of their home and possibly life. No significant statistical difference was reported between homeowners in their level of concern towards wildland fire.

Homeowners' Perception of Fuel Treatment Effectiveness

To minimize property and potential loss of life to wildland fire, homeowners may reduce fuel accumulations on their property. This fire-related action is a way in which homeowners may protect their homes from wildland fires by removing brush, trees, and other organic material that could potentially ignite in the event of a wildland fire. Because of the fire-prone condition of our national forests, it is necessary to evaluate fuel treatment compliance in the California, Colorado, and Florida wildland-urban interface areas studied.

In the California wildland-urban interface areas studied, the results of the t-tests for homeowners' overall compliance toward fuel treatments (Table 12) indicates no differences between seasonal and permanent homeowners. Both permanent (mean = 3.45) and seasonal (mean = 3.35) homeowners believed fuel treatment compliance would possibly reduce the risk of losing their home to a wildland fire.

In the Colorado wildland-urban interface areas studied, there was a statistically significant difference between permanent and seasonal homeowners in their beliefs that fuel treatment compliance would reduce personal fire risk (Table 12). By comparing fuel treatment compliance between the two residency

Table 12. Homeowners' Perception that Compliance Would Reduce Personal Fire Risk

Outcome/Evaluation	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
If compliance has reduced the risk of losing home due to a wildland fire	3.45	.15	3.35	.12	-.498	.61
Colorado	n=254		n=66			
If compliance has reduced the risk of losing home due to a wildland fire	3.72	.10	3.18	.18	-2.45	.01
Florida	n=267		n=57			
If compliance has reduced the risk of losing home due to a wildland fire	3.19	.12	3.32	.25	.468	.64

aScale ranged from 0 to 6 where 0 represented no protection against wildland fire to 6 which represented absolutely protected from a wildland fire.

groups, it is clear that permanent homeowners believed implementing such fuel treatments would reduce the risk of property loss at a higher level than seasonal homeowners.

In the Florida wildland-urban interface areas studied, overall compliance toward fuel treatments indicates no variation between means for seasonal and permanent homeowners (Table 12). Both permanent (mean = 3.19) and seasonal (mean = 3.32) homeowners believed fuel treatment compliance would possibly reduce the risk of losing their home to a wildland fire. No significant difference is reported between seasonal and permanent homeowners.

Beliefs that Fuel Treatments Produce Certain Outcomes

Independent samples t-tests were first used to compare seasonal and permanent homeowners at all three study sites on beliefs that the three fuel treatments produces a set of outcomes. Overall, permanent and seasonal homeowners across the three study sites were similar in their beliefs that fuel treatments produce certain outcomes. The results of the t-tests (Table 13) show a significant difference for permanent homeowners, in the California wildland-urban interface areas studied, in their belief that prescribed burning allows fires to get out of control as compared to seasonal homeowners. Both seasonal and permanent homeowners believed prescribed fire reduces the cost of fighting an uncontrolled wildland fire, reduces the number of acres burned in an unplanned wildland fire, and restores the forest to a more natural condition. No significant statistical difference was observed between California seasonal and permanent homeowners in their beliefs that prescribed fire produces certain outcomes.

In the Colorado wildland-urban interface areas studied, no significant statistical difference was observed between seasonal and permanent homeowners in their beliefs
that prescribed fire produces certain outcomes (Table 13). Seasonal and permanent homeowners believed prescribed fire reduces the number of acres burned in unplanned wildland fire, restores the forest to a more natural condition, and allows fires to get out of control. Both seasonal and permanent homeowners believed prescribed fire improves conditions for wildlife, negatively

impacts scenery, and saves money by reducing the cost of fighting an uncontrolled wildland fire.

In the Florida wildland-urban interface areas studied, no significant statistical difference was observed between seasonal and permanent homeowners in their beliefs

that prescribed fire produces certain outcomes (Table 13). Both seasonal and permanent homeowners believed that prescribed fire saves money by reducing the cost of fighting an uncontrolled wildland fire, improves conditions for wildlife, and reduces the number of acres burned in an unplanned wildland fire. Both seasonal and permanent homeowners believed equally that prescribed fire creates more smoke in the short-term, but less smoke over time. No significant statistical difference was observed between Florida seasonal and permanent homeowners in their beliefs that prescribed fire produces certain outcomes.

Table 13. Beliefs that Prescribed Burning Produces Certain Outcomes

Outcome/Evaluation	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Reduces the acres burned in unplanned wildland fires	3.84	.15	3.78	.12	-.310	.75
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.55	.18	3.91	.13	1.701	.09
Creates more smoke in the short-term, but less smoke over time	3.55	.14	3.46	.11	-.540	.59
Negatively impacts scenery	3.45	.15	3.60	.15	.715	.47
Allows fires to get out of control	3.28	.17	2.50	.14	-3.586	.00
Restores the forest to a more natural condition	3.01	.19	3.29	.14	1.224	.22
Improves conditions for wildlife	2.95	.18	2.88	.15	-.306	.76
Colorado	n=254		n=66			
Improves conditions for wildlife	4.21	.10	4.08	.20	-.582	.56
Saves money by reducing the cost of fighting an uncontrolled wildland fire	4.20	.11	3.89	.20	-1.358	.17
Reduces the acres burned in unplanned wildland fires	4.13	.09	4.24	.18	.526	.59
Restores the forest to a more natural condition	4.01	.11	4.03	.19	.084	.93
Creates more smoke in the short-term, but less smoke over time	3.71	.10	3.75	.17	.183	.85
Negatively impacts scenery	3.29	.11	3.13	.16	-.746	.45
Allows fires to get out of control	2.36	.08	2.43	.19	.345	.73
Florida	n=267		n=57			
Saves money by reducing the cost of fighting an uncontrolled wildland fire	5.02	.09	5.09	.16	.337	.73
Improves conditions for wildlife	4.51	.11	4.41	.24	-.407	.68
Restores the forest to a more natural condition	4.49	.11	4.42	.21	-.281	.77
Reduces the acres burned in unplanned wildland fires	4.46	.12	4.60	.21	.538	.59
Creates more smoke in the short-term, but less smoke over time	4.19	.11	4.19	.26	-.028	.97
Negatively impacts scenery	2.36	.12	2.22	.23	-.520	.60
Allows fires to get out of control	1.40	.08	1.24	.19	-.793	.42

aScale ranged from 0 to 6 where 0 represented zero likelihood that prescribed burning produced that outcome and 6 represented the homeowner was certain of prescribed burning produces that outcome.

In the California wildland-urban interface areas studied, the results of the t-tests for mechanical fuel reduction (Table 14) indicate no variation between seasonal and permanent homeowners. Seasonal and permanent homeowners believed mechanical fuel reduction was more likely to restore the forest to a more natural condition, reduces the number of acres burned in unplanned wildland fires, and save money by reducing the cost of fighting an uncontrolled wildland fire. Both seasonal and permanent homeowners believed mechanical fuel reduction would improve conditions for wildlife.

No significant statistical difference was observed between seasonal and permanent homeowners in their beliefs that mechanical fuel reduction produces certain outcomes.

In the Colorado wildland-urban interface areas studied, a significant difference between permanent and seasonal homeowners was observed in their belief that mechanical fuel reduction produces certain outcomes, such as commercial logging (Table 14). Seasonal and permanent homeowners believed that mechanical fuel reduction saves money by reducing the cost of fighting an uncontrolled wildland fire, improves conditions for wildlife, and negatively impacts scenery. Both seasonal and permanent homeowners believed mechanical fuel reduction would restore the forest to a more natural condition, while reducing the acres burned in an unplanned wildland fire. No significant statistical difference was observed between Colorado seasonal and permanent homeowners in their beliefs that mechanical fuel reduction produces certain outcomes.

In the Florida wildland-urban interface areas studied, seasonal and permanent homeowners did not differ in their beliefs that mechanical fuel reduction produces certain outcomes (Table 14). Permanent and seasonal homeowners believed that mechanical fuel reduction would reduce

Table 14. Beliefs that Mechanical Fuel Reduction Produces Certain Outcomes

Outcome/Evaluation	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Reduces the acres burned in unplanned wildland fires	3.73	.18	3.84	.13	.513	.60
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.56	.18	3.69	.12	.596	.55
Uses commercial logging	2.92	.17	3.01	.13	.426	.67
Improves conditions for wildlife	2.91	.19	2.78	.15	-.557	.57
Negatively impacts scenery	2.77	.16	2.89	.14	.545	.58
Restores the forest to a more natural condition	2.64	.18	2.86	.14	.973	.33
Colorado	n=254		n=66			
Reduces the acres burned in unplanned wildland fires	4.04	.09	4.10	.20	.270	.78
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.87	.10	3.74	.22	-.580	.56
Improves conditions for wildlife	3.56	.11	3.35	.22	-.838	.40
Uses commercial logging	3.56	.11	3.07	.23	-2.009	.04
Restores the forest to a more natural condition	3.17	.11	3.30	.21	.501	.61
Negatively impacts scenery	2.87	.11	2.77	.20	-.387	.69
Florida	n=267		n=57			
Reduces the acres burned in unplanned wildland fires	3.77	.12	4.17	.25	1.431	.15
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.92	.12	3.89	.24	-.105	.91
Uses commercial logging	3.44	.12	3.57	.25	.482	.63
Improves conditions for wildlife	3.10	.13	3.28	.28	.601	.54
Restores the forest to a more natural condition	2.86	.13	2.61	.25	-.849	.39
Negatively impacts scenery	2.77	.13	2.69	.25	-.281	.77

aScale ranged from 0 to 6 where 0 represented zero likelihood that mechanical fuel reduction produced that outcome and 6 represented the homeowner was certain mechanical fuel reduction produces that outcome.

the number of acres burned in an unplanned fire and improve conditions for wildlife. Both seasonal and permanent homeowners believed mechanical fuel reduction restored the forest to a more natural condition, and negatively impacts scenery. No significant statistical difference was observed between seasonal and permanent homeowners in their beliefs that mechanical fuel reduction produces certain outcomes.

Table 15 describes homeowners' beliefs that defensible space produces certain outcomes. In the California wildland-urban interface areas studied, a significant difference was observed between permanent and seasonal homeowners in their belief that commercial logging should be used in combination with defensible space. Seasonal and permanent homeowners believed defensible space saved money by reducing the cost of fighting an uncontrolled wildland fire while reducing the number of acres burned. There was no significant statistical difference between seasonal and permanent homeowners in their beliefs that defensible space produces certain outcomes.

In the Colorado wildland-urban interface areas studied, a significant statistical difference between permanent and seasonal homeowners was observed in their belief that trees harvested from implementing a defensible space around a private residence could be used for commercial logging (Table 15). Permanent and seasonal homeowners (mean = 3.89) shared equal

beliefs that defensible space would save money by reducing the cost of fighting an uncontrolled wildland fire. Permanent (mean = 3.69) and seasonal (mean = 3.56) homeowners believed a defensible space would reduce the number of acres burned in unplanned wildland fires. There was no significant statistical difference between homeowners in their beliefs that defensible space produces certain outcomes.

In the Florida wildland-urban interface areas studied, seasonal and permanent homeowners did not differ in their beliefs that defensible space would produce certain outcomes (Table 15). Seasonal and permanent

Table 15. Beliefs that Defensible Space Produces Certain Outcomes

Outcome/Evaluation	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.51	.15	3.49	.14	-.092	.92
Reduces the acres burned in unplanned wildland fires	3.41	.17	3.59	.15	.766	.44
Improves conditions for wildlife	2.24	.17	2.42	.15	.806	.42
Restores the forest to a more natural condition	2.24	.17	2.41	.14	.791	.43
Negatively impacts scenery	2.30	.18	2.25	.15	-.218	.82
Uses commercial logging	2.29	.20	1.78	.14	-2.158	.03
Colorado	n=254		n=66			
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.89	.10	3.89	.20	-.580	.56
Reduces the acres burned in unplanned wildland fires	3.69	.11	3.56	.24	.270	.78
Improves conditions for wildlife	2.79	.12	2.57	.20	-.838	.40
Negatively impacts scenery	2.54	.11	2.52	.20	-.387	.69
Restores the forest to a more natural condition	2.47	.11	2.37	.19	.501	.61
Uses commercial logging	2.22	.12	1.64	.22	-2.009	.04
Florida	n=267		n=57			
Saves money by reducing the cost of fighting an uncontrolled wildland fire	3.74	.12	3.86	.27	.420	.67

Reduces the acres burned in unplanned wildland fires	3.61	.13	3.96	.27	1.148	.25
Improves conditions for wildlife	2.67	.13	2.33	.25	-1.132	.25
Restores the forest to a more natural condition	2.58	.13	2.23	.28	-1.110	.26
Uses commercial logging	2.52	.12	2.51	.25	-.021	.98
Negatively impacts scenery	2.41	.13	2.39	.26	-.061	.95

aScale ranged from 0 to 6 where 0 represented zero likelihood that defensible space produced that outcome and 6 represented the homeowner was certain of defensible space produces that outcome.

homeowners believed defensible space reduced the number of acres burned in an unplanned wildfire and saved money by reducing the cost of fighting an uncontrolled wildland fire. Permanent and seasonal homeowners believed defensible space would improve conditions for wildlife and restore the forest to a more natural condition. Permanent (mean = 2.41) and seasonal (mean = 2.39) homeowners were similar in their beliefs that defensible space negatively impacted scenery. There was no significant statistical difference between homeowners in their beliefs that defensible space produces certain outcomes.

By comparing permanent to seasonal responses on their beliefs towards fuel treatments, overall, it is clear that there are only a few outcomes of these treatments that the two residency groups view differently. Three of the four significant differences were related to commercial logging and forest health issues.

Homeowners' Attitude Toward Fuel Treatments

The results of the t-tests for attitudes toward fuel treatment approaches indicate variation between means for seasonal and permanent homeowners. In the California wildland-urban interface areas studied, a statistically significant

difference is reported between permanent (mean = 2.23) and seasonal (mean = 1.50) homeowners in terms of their attitude toward defensible space with permanent homeowners much more favorable (Table 16).

In the Colorado wildland-urban interface areas studied, seasonal and permanent homeowners did not differ in their attitudes toward fuel treatments. Permanent (1.70) and seasonal (mean = 1.77) homeowners held positive attitudes toward defensible space (Table 16). There was no significant statistical difference between homeowners in their attitudes towards fuel treatments.

In the Florida wildland-urban interface areas studied, homeowners did not differ in their attitude toward fuel treatments. Permanent homeowners held positive attitudes towards prescribed burning (mean = 2.03), mechanical fuel reduction (mean = 1.72), and defensible space (mean = 1.35) (Table 16).

Table 16. Attitude Toward Fuel Management Approaches

Fuel Treatment Approaches	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Defensible Space	2.23	.12	1.50	.13	-3.790	.00
Mechanical Fuel Reduction	1.68	.15	1.42	.12	-1.357	.17
Prescribed Burning	-.17	.20	.13	.16	1.217	.22
Colorado	n=254		n=66			
Defensible Space	1.70	.11	1.77	.19	.293	.77
Mechanical Fuel Reduction	1.51	.11	1.36	.22	-.640	.52
Prescribed Burning	.53	.13	.22	.26	-1.111	.26
Florida	n=267		n=57			
Prescribed Burning	2.03	.09	1.68	.24	-1.542	.12
Mechanical Fuel Reduction	1.72	.10	1.55	.21	-.702	.48
Defensible Space	1.35	.11	1.23	.24	-.477	.63

aScale ranged from -3 to 3 where –3 represented an extremely negative attitude towards fuel treatments, 0 represented neutral, and 3 represented an extremely positive attitude.

Overall Approval of Selected Fuel Treatments

In the California wildland-urban interface areas studied, the result of the t-tests for homeowners' approval of fuel treatment indicate no significant variation between seasonal and permanent homeowners (Table 17). Permanent homeowners (mean = 1.76) were more likely to support defensible space than mechanical fuel reduction and prescribed burning as a method to reduce the risk of property loss. Homeowners were not supportive of prescribed burning in the California wildland-urban interface areas studied.

In the Colorado wildland-urban interface areas studied, homeowners did not differ in their support of fuel treatments (Table 17). Seasonal homeowners (mean = 1.87) were more likely to support defensible space than mechanical fuel reduction and prescribed burning as a method to reduce the risk of property loss. Homeowners were supportive of mechanical fuel reduction, prescribed burning, and defensible space. No significant statistical difference was reported between homeowners in their support for fuel treatments.

Table 17. Intent to Support Fuel Treatments

Fuel Treatment Approaches	Permanent Meana	St. Error	Seasonal Meana	St. Error	t	Sig
California	n=119		n=176			
Defensible Space	1.76	.17	1.38	.13	-1.776	.07
Mechanical Fuel Reduction	1.11	.17	1.16	.13	.234	.81
Prescribed Burning	.16	.20	.12	.15	.217	.82
Colorado	n=254		n=66			
Defensible Space	1.79	.09	1.87	.17	.410	.68
Mechanical Fuel Reduction	1.24	.12	1.03	.19	-.845	.39
Prescribed Burning	.83	.12	.89	.24	.207	.83
Florida	n=267		n=57			
Prescribed Burning	2.14	.09	2.17	.16	.107	.91
Defensible Space	1.25	.11	1.20	.18	-.221	.82
Mechanical Fuel Reduction	1.13	.11	1.06	.23	-.302	.76

aScale ranged from -3 to 3 where -3 represented strong disapproval of fuel treatments, 0 represented neutral, and 3 which represented strong approval.

In the Florida wildland-urban interface areas studied, seasonal and permanent homeowners did not differ in their support for fuel treatments. Permanent homeowners (mean = 1.87) were more likely to support prescribed burning than defensible space and mechanical fuel reduction as a method to reduce fire-related risk. Homeowners were supportive of mechanical fuel reduction, prescribed burning, and defensible space. There was no significant statistical difference between homeowners in their support for fuel treatments.

Results of the Hypothesis Test and Results Summary

The extent fire of management/fuel treatments implemented by seasonal or permanent homeowners was tested by chi-square statistical tests (Tables 9-11). The level of perceived risk to wildfire between seasonal and permanent homeowners was tested using independent samples t-tests (Table 12). The level of beliefs outcomes, attitudes, and support by seasonal homeowners in comparison to permanent homeowners were tested using independent samples t-tests (Tables 13-17).

H1: Seasonal and permanent homeowners will not differ in the extent to which fuel treatments have been implemented on their property.

The first hypothesis was stated as a null and examined each wildland-urban interface area studied separately. In California permanent homeowners differed in the extent to which fuel treatments have been implemented as

compared to seasonal homeowners. Permanent homeowners had completed a significantly greater variety of fire-related actions than seasonal homeowners. This null hypothesis is rejected.

Seasonal and permanent homeowners in Colorado did not differ in the extent to which fuel treatments have been implemented. Null is accepted.

Seasonal and permanent homeowners in Florida did not differ in the extent to which fuel treatments have been implemented. Null is accepted.

H2: Seasonal and permanent homeowners will not differ in their perceived level of risk toward wildfire.

Seasonal and permanent homeowners in California did not differ in their perceived level of risk toward wildfire. Null is accepted.

In Colorado permanent homeowners differed in their perceived level of risk toward wildfire as compared to seasonal homeowners. Permanent homeowners, in comparison to seasonal homeowners, reported higher levels of concern toward fire-related risk and believed their efforts could reduce their risks. This null hypothesis is rejected.

Seasonal and permanent homeowners in Florida did not differ in their perceived level of risk toward wildfire. Null is accepted.

H3: Seasonal and permanent homeowners will not differ in their beliefs, attitudes, and support of fire management as exercised with fuel treatments.

Seasonal and permanent homeowners in California did not differ in their beliefs, attitudes, and support toward fire management as exercised with fuel treatments. Null is partially rejected for defensible space and acceptable for prescribed burning and mechanical fuel reduction.

Seasonal and permanent homeowners in Colorado did not differ in their beliefs, attitudes, and support toward fire management as exercised with fuel treatments. Null is accepted.

Seasonal and permanent homeowners in Florida did not differ in their beliefs, attitudes, and support toward fire management as exercised with fuel treatments. Null is accepted.

CHAPTER 5

DISCUSSION OF RESULTS

Summary

The problem of the study was to understand how seasonal and permanent homeowners who live in wildland-urban interface areas might differ in their beliefs and attitudes about fire and fire management programs in their yard, neighborhood, and community. In particular, this study was designed to determine the extent to which homeowners have implemented fuel treatments on their property; how homeowners have considered the risk of fire during their home tenure; and, homeowners' beliefs, attitudes, and support of fire management as exercised with fuel treatments.

Since the study focused on fuel treatments within specific geographic regions, three National Forests were selected to represent different communities and forest types. A national registry of communities at risk was reviewed to facilitate the selection process. Study sites included San Bernardino National Forest, California; Grand Mesa, Uncompahgre and Gunnison National Forests/Bureau of Land Management (BLM) land, Colorado; and Apalachicola National Forest, Florida. Within the wildland-urban interface areas studied, the study sites were purposively selected and stratified by seasonal and permanent homeowners, and then households randomly selected. The overall sample size included 2,781 households from the three wildland-urban interface study sites. A total of 281 bad addresses existed, which lowered the effective sample size to 2,500 households. In total, 939 households were viable respondents in the

study. All respondents completed a self-administered mail survey that was used to determine the extent to which homeowners have implemented fuel treatments, considered the risk of fire during their home tenure, and their beliefs, attitudes, and support of fire management as exercised with fuel treatments.

To test the hypotheses, a chi-squared analysis or an independent sample two-tailed t-tests was used to compare seasonal and permanent homeowners' responses. Homeowners' experience with fire and their actions of becoming educated or involved with fire prevention was analyzed using chi-squared analysis. Independent sample two-tailed t-tests were performed to determine differences between seasonal and permanent homeowners on their level of concern toward fire-related risk held by homeowners; homeowners' beliefs that fuel treatments produce certain outcomes; homeowners' attitude toward fuel treatments; and, homeowners' intent to support fuel treatments.

Conclusions

Within the limitations of the study, the following conclusions are provided:

1. In the California wildland-urban interface area studied, permanent homeowners had more fire-related experiences as compared to seasonal homeowners; and in the Colorado and Florida wildland-urban interface areas studied, seasonal and permanent homeowners had similar fire-related experiences.
2. In the California wildland-urban interface area studied, permanent homeowners were more likely to become educated or involved with fire prevention; and in the Colorado and Florida

wildland-urban interface areas studied, seasonal and permanent homeowners were equally likely to become educated or involved with fire prevention.

3. In the California, Colorado, and Florida wildland-urban interface areas studied, seasonal and permanent homeowners held high levels of concern toward the perceived risk of wildland fires.
4. In the California and Florida wildland-urban interface areas studied, seasonal and permanent homeowners held similar beliefs that fuel treatment compliance would "possibly" reduce personal fire risk; and in the Colorado wildland-urban interface areas studied, permanent homeowners held higher beliefs that fuel treatment compliance would "possibly" reduce personal fire risk in comparison to seasonal homeowners.
5. In the California wildland-urban interface area studied, permanent homeowners were more likely to believe defensible space would reduce the risk of losing their home to a wildland fire as compared to seasonal homeowners; and in the Colorado and Florida wildland-urban interface areas studied, seasonal and permanent homeowners were similar in their beliefs that fuel treatments produce certain outcomes.
6. In the California wildland-urban interface area studied, permanent homeowners held very positive attitudes toward defensible space, and negative attitudes toward prescribed

burning; whereas in the Colorado wildland-urban interface areas studied, permanent and seasonal homeowners did not differ in their attitudes toward fuel treatments; and in the Florida wildland-urban interface areas studied, permanent and seasonal homeowners held very positive attitudes toward prescribed burning.

7. In the California, Colorado, and Florida wildland-urban interface areas studied, permanent and seasonal homeowners were equally supportive of fuel treatments. In the California and Colorado wildland-urban interface areas studied, homeowners were most supportive of defensible space, followed by mechanical fuel reduction; whereas in the Florida wildland-urban interface areas studied, homeowners were most supportive of prescribed burning, followed by defensible space, and mechanical fuel reduction.

Discussion

As our population continues to increase, more people are projected to live adjacent to or within rural, natural resource areas. Due to this demographic shift and complex fuel configurations, fire-related risk to life and property losses increases. The heightened costs and risk of wildfire in the wildland-urban interface begs for evaluation of the public's perception and knowledge of fuel treatments to target fire policy at the wildland-urban interface and manage this rapidly changing landscape. Both differences and similarities existed between

seasonal and permanent homeowners with respect to their perspectives and actions toward wildland fire. It was important to assess these similarities and differences in the extent to which fuel treatments were implemented by homeowners, homeowners' perceived level of risk toward wildland fire, and homeowners' beliefs, attitudes, and support of fire management as exercised with fuel treatments.

In the California wildland-urban interface areas studies, permanent homeowners differed in the extent to which fuel treatments were implemented near their home as compared to seasonal homeowners. In terms of fuel treatment compliance, permanent homeowners (68%) were more likely to implement a defensible space (based on self-reports) around their residence as compared to seasonal homeowners (52%). These results could be linked to Firewise education campaigns and outreach programs that were in place at the time of our study. These programs fostered increased communication between fire managers and homeowners, public involvement, and participation in mechanical fuel treatment programs. In the Colorado and Florida wildland-urban interface areas studied, seasonal and permanent homeowners tended not to differ in the extent to which fuel treatments were implemented.

In the California wildland-urban interface area studied, permanent homeowners had more fire-related experiences and were more likely to become educated or involved with fire prevention than seasonal homeowners. Permanent homeowners indicated that they experienced higher levels of wildland fire-related smoke (82%), observed a higher frequency wildland fires (80%), and

personally witnessed more road closures (77%) as compared to seasonal homeowners. These results may be that over a lifetime California residents who may have purchased their "mountain home" as a seasonal vacation home, and then moved into the area full-time have had greater opportunities to be exposed to fire effects and experiences.

In the Colorado and Florida wildland-urban interface areas studied, seasonal and permanent homeowners had fairly similar fire-related experiences. In terms of fire education and prevention, in the Colorado wildland-urban interface area studied, permanent homeowners were more likely to become educated or involved with fire prevention than seasonal homeowners; whereas, in the Florida wildland-urban interface areas studied seasonal homeowners were more likely to become educated or involved with fire prevention than permanent homeowners. Differences between homeowners in Colorado could be possibly explained as active Red Cross fire education programs were in place at the time of our study site visit. These fire-related actions and experiences facilitate an understanding of how homeowners' can potentially reduce the risk of wildland fire.

In the California, Colorado, and Florida wildland-urban interface areas studied, permanent and seasonal homeowners were similar in their belief about fire-related risk and believed that compliance with fuel treatments would reduce personal fire risk. In the California wildland-urban interface areas studied, permanent (mean = 4.63) and seasonal (mean = 4.51) homeowners' greatest concern was the possibility of losing their home, and possibly life, from a wildland

fire. In the Colorado wildland-urban interface areas studied, permanent (mean = 4.57) and seasonal (mean = 4.55) homeowners' greatest concern was wildland fires in Colorado (in general); similarly, in the Florida wildland-urban interface areas studied, permanent (mean = 4.29) and seasonal (mean = 4.18) homeowners' greatest concern was the overall issue of wildland fires in Florida. In the Colorado wildland-urban interface areas studied, permanent homeowners (mean = 4.40) were also concerned about the level of attention tourists and campers in regard to wildland fires as compared to seasonal homeowners (mean = 4.16). While homeowners in all three areas had high levels of concern about wildfire, they were only moderately certain their knowledge about wildland fires and actions taken to reduce the risk of losing their homes would payoff.

California. Though all of the study sites were not compared within the study, California permanent homeowners held the most positive attitude toward defensible space practices. A statistically significant difference was reported between permanent

(mean = 2.23) and seasonal (mean = 1.50) homeowners in terms of their attitude toward defensible space with permanent much more favorable. This attitude towards the effectiveness of defensible space may be explained through an interpretation of the evolution of the role of the seasonal home through the residents' life course. California seasonal residents may have purchased their vacation home within the wildland-urban interface early within their life course. With age, this seasonal home may have evolved into an attractive retirement home for permanent residential status. This possible evolution, combined with

exposure to fire effects and increased fire-related experiences, may explain the positive attitude towards defensible space.

Exposure to fire effects and increased fire-related experiences may have shaped permanent residents' attitude toward prescribed burning as a fuel reduction technique. In California, permanent homeowners had more fire-related experiences than seasonal homeowners. Permanent homeowners indicated that they experienced higher levels of wildland fire-related smoke (82%), observed a higher frequency of wildland fires (80%), and personally witnessed more road closures (77%) as compared to seasonal homeowners. Though all of the study sites were not compared within the study, California permanent homeowners held the lowest (slightly negative) attitude score for prescribed burning as a fuel reduction technique.

Colorado. In the Colorado wildland-urban interface area studied, seasonal and permanent homeowners were similar in their attitudes that fuel management actions would produce certain outcomes. Both seasonal (mean = 3.18) and permanent (mean = 3.72) residents were similar in their belief that fuel treatment compliance would reduce the risk of losing their home due to a wildland fire. However, in the Colorado wildland-urban interface area studied, a significant difference between permanent and seasonal homeowners was observed in their belief that commercial logging exercised with mechanical fuel reduction produces certain outcomes. These findings are consistent with Winter et al. (2002) who determined that mechanical fuel treatments are the preferred option for fuel

hazard mitigation in Marin County, California, Clay County, Florida, and Oscoda County, Michigan.

Florida. In the Florida wildland-urban interface area studied, seasonal and permanent homeowners were similar in their attitudes that fuel management actions would produce certain outcomes. Though the study sites were not compared, within the Florida wildland-urban interface area studied, homeowners had more prescribed fire-related experiences as compared to California or Colorado. Prescribed fire is actively used by the Forest Service on the Apalachicola National Forest, which results in homeowners having more exposure to this fuel treatment. In total, this could explain why Florida residents were much more supportive of prescribed fire as compared to California and Colorado homeowners.

Limitations

Data were collected during late fall/winter or at the low risk fire season periods, where residents' actions and psychological responses may be different from the actual fire season where experiences and media coverage are heightened in wildland fire areas. Since response rates were lower than expected, a higher number of respondents would have resulted in lower statistical error and more accurate statistical tests. Finally, the study results suggest that permanent homeowner respondents were better educated, reported higher income levels, and were primarily male in comparison to census data. Seasonal homeowners also probably had higher discretionary income to be able to purchase a seasonal home for occasional recreational use.

Theoretical Implications

This study contributes to the understanding of homeowners' beliefs, attitudes, and support of fire management as exercised with fuel treatments. Each component of the theory of reasoned action was examined within the context of a framework for understanding seasonal and permanent homeowners in wildland-urban interface areas implementing fuel treatment programs. This study's results suggest that the components within the framework may play an essential role in homeowners' decision to implement fuel treatments (Ajzen & Fishbein, 1980). This study has shown that homeowners' beliefs, attitudes, and support of fire management as exercised with fuel treatments is important in understanding their perception of fire-related risks, as noted by Bright et al., (1993), Manfredo et al., (1990), and Winter et al. (2002). In addition, both in this study and related studies (Bright & Manfredo, 1997; Fried et al., 1999; Gardner et al., 1987; Hodgson, 1995; Shindler & Reed, 1996), homeowners' beliefs that certain fuel treatments lead to outcomes suggests varying levels of knowledge about each fuel treatment.

Practical Applications

The findings of this study may facilitate the development of fire policy and fire/fuel management by resource agencies and local governments. By understanding the similarities and differences between seasonal and permanent homeowners, planners, resource managers, and policy makers will need to consider that these residents may differ in their attitudes toward and experiences with fuel reduction techniques.

Furthermore, a better understanding of these homeowners will facilitate more public support and understanding of fire policy, which could lead to better fuel management, improved public involvement, and enhanced communication regimes with fire/land managers and homeowners in effected wildland-urban interface areas. Because of this risk perception, homeowners may differ in the extent to which fuel treatments are implemented. The decision to implement fuel treatments is more than likely based on the homeowners' beliefs, attitudes, and support of fire management and fuel hazard mitigation programs. The decision to implement fuel treatments may also be closely linked to the homeowners' perception that such measures would produce certain outcomes. Planners, resource managers, and policy makers will need to consider that these residents may differ in their attitudes toward and experiences with fuel reduction techniques in decision making and planning.

The results of this study show efforts (i.e., education programs, compliance or regulatory checking) with homeowners in California (Big Bear Lake area) appear to be reaching permanent homeowners. Seasonal homeowners may require other types of programs and communications in order to effectively implement fuel treatments. When neighborhoods and wildland-urban interface areas have a checkerboard of permanent and seasonal homeowners, fairly similar levels of fuel reduction are necessary for the entire hazard mitigation to be effective. In the Colorado and Florida wildland-urban interface areas studied, actions, involvement, and experiences were already lower for seasonal and permanent homeowners compared to California results

levels. More active fuel management programs and education may be necessary if greater numbers of households and homes are to be built in wildland-urban interface areas.

Fire managers must maintain open communication between firefighters, homeowners, and other stakeholders. This could be accomplished through Firewise programs (California), Red Cross Volunteers (Colorado), and homeowner associations. This communication regime should embrace a fire education component and public involvement in active fuel hazard mitigation programs, which target both seasonal and permanent homeowners. Firefighters must also be involved in these programs. In this way, firefighters may have an increased understanding of the community they serve, gain valuable work experience and training opportunities by participating in fuel treatment programs, and offer suggestions for home protection based on their expertise.

Homeowners should collaborate to insure a defensible space is implemented around all properties in their community. This effort would increase the attractiveness of the community to new residents and provide an understanding of fire safe behavior and actions for new property owners. If homeowners were able to collaborate on implementing fuel treatments, they could possibly lobby insurance companies to decrease their homeowners' insurance. This in turn would provide homeowners an incentive to implement a defensible space while saving money on insurance premiums.

Finally, the findings of this study will increase the understanding of home purchasers in the wildland-urban interface. As our population continues to

increase, more people will choose to live adjacent to or within rural, natural resource areas. Many will choose the wildland-urban interface as a viable option to build or purchase a retirement or permanent home. By understanding the demographic shift to the wildland-urban interface, planners, land managers, and policy makers may be best prepared for informed decision making and planning in regards to fire and fuel reduction management.

Recommendations for Further Study

To further our understanding of the human response to fuel reduction efforts, these three future study areas are suggested:

1. This study could be replicated to compare other communities at risk for wildland fires.
2. This study could be repeated on an annual or bi-annual basis to serve as a barometer to measure changes in beliefs, attitudes, and support of fuel treatments to determine whether education and risk reduction practices are impacting local homeowners' understanding and support of wildland fire programs.
3. A longitudinal study should be conducted to observe trends in beliefs, attitudes, and support of fuel treatments as a national fire plan provides both policies and initiatives to create a healthier and safer forests and communities.

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APPENDIX A

MAIL SURVEY INSTRUMENT

Wildland Fire Study

A national survey about fire management in the wildland-urban interface

Focusing on residential areas in or near the San Bernardino National Forest

Michigan State University and the United States Forest Service have formed a partnership to help forest fire managers understand your views on forest fires and forest management. Please answer all of the questions and add any additional comments in the space provided on the last page of the survey.

Please return the survey in the postage paid envelope when you are finished.

Thanks for your help!

Dr. Christine Vogt
Department of Park, Recreation and Tourism Resources
Michigan State University
172 Natural Resources Building
East Lansing, MI 48824-1222
517-353-0793 x128

Fire is an ever-present, natural part of the landscape. Your views on this topic are very important to fire managers as they decide how to protect homes and conserve our nation's forests and wildlife in the future. Your participation in this survey is important and greatly appreciated. Please keep in mind that we are interested in your opinions and ideas, there are no right or wrong answers to the following questions.

Section 1. These questions ask about the length and type of your residency in or near the mountainous regions of the San Bernardino County. The study areas include Sugarloaf, Big Bear Lake, and Running Springs.

1. Which statement best describes your residential status in or near the mountainous regions of the San Bernardino National Forest for the address this survey was sent to? *(please √one)*

   ☐ I am a full-time, permanent, year-round resident who owns my home
   ☐ I am a part-time, seasonal resident who owns my home *(please √which one applies best)*
      ☐ I am retired and only reside at this residence during certain seasons/time periods
      ☐ I use the residence for vacations/weekend use
      ☐ Something else *(please describe)*:_____
   ☐ I am a landlord
   ☐ None of the above describes my residential status *(please describe)*:___

2. What year did you acquire your residence described in question 1? *(fill in the year)*

3. How did you acquire your home in or near the mountainous regions of the San Bernardino National Forest? *(please √one)*

   ☐ Property was handed down or purchased from within the family
   ☐ Property was purchased with the help of a realtor or sales office
   ☐ Property was purchased directly from previous owner
   ☐ Another way
   (*please describe*)_____

4. Are you or your spouse currently retired or planning to retire by 2005? *(please √one)*

   ☐ No ☐ Yes →What year did you or your spouse retire or plan to retire?*(fill in a year)*

   Yourself _____ Spouse _____

5. When you retire, do you plan to live full-time in or near the mountainous regions of the San Bernardino National Forest? *(√one)*

   ☐ Not applicable, already retired
   ☐ Yes, I will live full-time in the mountainous regions of the National Forest
   ☐ No, I will live in the mountainous regions of the San Bernardino part of the year and elsewhere the rest of the year

☐ No, I will not be living in this area *(please explain):*_____

6. What is the approximate size of your residential lot?*(Enter "0" if you own the house but not the land)*_____ x _____ ft or _____acres

7. Please describe your home in or near the mountainous regions of the San Bernardino National Forest. *(√one)*

☐ Single family ☐ Mobile home
☐ Detached condo ☐ Other *(please describe)*_____
☐ Attached condo

8. How far is it from your home to the nearest land owned by the US Forest Service? *(please √one)*

☐ less than ½ mile ☐ 3 - 4 miles
☐ ½ mile - less than 1 mile ☐ 5 - 6 miles
☐ 1 - 2 miles ☐ Not sure

9. Do you or others in your household visit the San Bernardino National Forest for recreation? *(please √one)*

☐ No, *skip to question 11* ☐ Yes → If Yes, how often?*(please √one)*
☐ Daily or weekly ☐ Couple times a month ☐ Couple times a year

10. Considering all of the outdoor recreation you have enjoyed over the past 12 months in the San Bernardino National Forest, please list up to 3 activities that mean the most to you and others in your household.

_____ & _____ &

Section 2. Next we would like to know about your thoughts about and experiences with wildland fire.

11. How much did you think about the possibility of wildland fire in the mountainous regions of the San Bernardino National Forest near your home at the following times? *(please circle one for each)*

At these times....	Not at All			Moderate Amount			A Great Deal	Not Sure
Before searching for a home	0	1	2	3	4	5	6	☐
During the home buying process	0	1	2	3	4	5	6	☐
After purchasing your home	0	1	2	3	4	5	6	☐

12. How knowledgeable do you feel you are on wildland fires in Florida? *(please circle one)*

Not at All Knowledgeable						**Very Knowledgeable**	**Not Sure**
0	1	2	3	4	5	6	☐

13. How would you evaluate your level of concern with the topics below? Circle the number that best fits your evaluation from "not at all concerned" to "very concerned." *(please circle one for each)*

How concerned are you about . . .	**Not at All Concerned**						**Very Concerned**
Wildland fires in Florida	0	1	2	3	4	5	6
Wildland fires resulting in loss of your home and possibly life	0	1	2	3	4	5	6
The level of attention by neighbors in regard to wildland fires	0	1	2	3	4	5	6
The level of attention by tourists/campers in regard to wildland fires	0	1	2	3	4	5	6

14. What level of consideration was given to the following features when <u>you purchased your house</u> in or near the mountainous regions of the San Bernardino National Forest? *(please circle one for each)*

Property features.....	**Not a Conside -ration**						**Very Strong Conside- ration**	**Not Sure**
Nonflammable roofing materials	0	1	2	3	4	5	6	☐
Trees/vegetation cleared 30 ft around home	0	1	2	3	4	5	6	☐
Heated by source other than a wood burning stove	0	1	2	3	4	5	6	☐
Exterior propane tank at least 10 ft from home	0	1	2	3	4	5	6	☐
Wide roads and driveways to facilitate easy access for emergency vehicles	0	1	2	3	4	5	6	☐
Adequate street signs and address labeling for locating home in a fire	0	1	2	3	4	5	6	☐
Fire protection service (firefighters, fire trucks)	0	1	2	3	4	5	6	☐
Fire hydrants in the neighborhood	0	1	2	3	4	5	6	☐

Pipe system that can draw water from lake	0	1	2	3	4	5	6	☐
Lot had relatively few highly flammable trees	0	1	2	3	4	5	6	☐
Location of home in relation to past fires	0	1	2	3	4	5	6	☐

15. How would you rate your general attitude toward the use of these three fuel management approaches near your home? *(please circle one for each statement)*

Fuel Management Approaches:	**Extremely Negative**			**Neutral**			**Extremely Positive**
Prescribed burning *Definition: Resource managers may use planned fire to reduce fuels, regenerate desired plant or animal species, and promote ecological health*	-3	-2	-1	0	1	2	3
Mechanical fuel reduction *Definition: Resource managers may use chainsaws, brush mowers, and specialized machines to cut and remove shrubs, trees, and other fuels*	-3	-2	-1	0	1	2	3
Defensible space *Definition: Homeowners maintaining a fire-safe zone consisting of 30 feet around homes that is free of flammable vegetation*	-3	-2	-1	0	1	2	3

16. Which of the following experiences have you had at any time in your life? *(please √all that apply)*

☐ Been personally injured by a wildland fire
☐ Suffered property damage from a wildland fire

☐ A prescribed burn has occurred near my home

☐ Experienced smoke from a wildland fire

☐ Been required to remove flammable vegetation on my property

☐ Personally witnessed a wildland fire
☐ Felt fear or anxiety as a result of a wildland fire

☐ A mechanical removal of trees has occurred near my home

☐ Experienced a road closure due to a wildland fire

☐ Implemented a defensible space around my residence

☐ Friends, family or neighbors suffered property damage from a wildland fire

☐ Experienced discomfort or health problems from smoke caused by a wildland fire

☐ Other fire experience *(please describe)*:_____

17. Which of the following <u>actions</u> have you taken at any time in your life? *(please √ all that apply)*

☐ Asked local fire department about how to reduce risk of property damage from wildland fire

☐ Read information on home protection from wildland fires

☐ Attended a park or forest interpretive program about wildland fire

☐ Attended a public meeting about wildland fire

☐ Observed effects of wildland fires on forests

☐ Observed neighbors being careless with fire

☐ Worked with wildland fires as a part of my job or as a volunteer

☐ Asked forest rangers how to reduce risk of property damage caused by wildland fire

☐ Worked with local fire department on neighborhood and community fire protection

☐ Evacuated my home or office due to wildland fires

☐ Other fire related actions *(please describe)*:

_____

18. If you have done anything to reduce the risk of losing your home to wildland fire, do you believe these efforts will protect your residence from a possible wildland fire? *(please circle one number)*

No			**Possibly**			**Absolutely**
0	1	2	3	4	5	6

19. Please respond to the following statements to the best of your ability by indicating whether you believe each is <u>true</u>, <u>false</u>, or you are <u>not sure</u>. *(please √one for each statement)*

	Generally True	**Generally False**	**Not Sure**
Wildland fires play a significant role in shaping many of the nation's forests.	☐	☐	☐
Humans cause most of the wildland fires in the U.S.	☐	☐	☐
Wildland fires can be an important force in controlling disease and insect outbreaks in forests and rangelands.	☐	☐	☐
Wildland fires kill the majority of large trees in the burned area.	☐	☐	☐
Many tree species require occasional fires so new trees can grow.	☐	☐	☐
Wildland fires kill a majority of the birds and mammals in a burned area.	☐	☐	☐

Section 3. This next section asks about your perceptions of and support for wildland fire and fuel management.

20. How likely do you think it is that prescribed burning will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			Somewhat Likely			Certain
Negatively impacts scenery	0	1	2	3	4	5	6
Creates more smoke in the short-term, but less smoke over time	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Allows fires to get out of control	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

21. How likely do you think it is that mechanical fuel reduction will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			Somewhat Likely			Certain
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

22. How likely do you think it is that defensible space will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement).*

	Zero Likelihood			**Somewhat Likely**			**Certain**
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

23. How would you rate your overall level of approval of the following fuel management approaches? *(please circle one number for each statement)*

	Strongly Disapprove			**Neither Approve/ Disapprove**			**Strongly Approve**
Prescribed burning	-3	-2	-1	0	1	2	3
Mechanical fuel reduction	-3	-2	-1	0	1	2	3
Defensible space	-3	-2	-1	0	1	2	3

Section 4. This final section asks for information about your household. This information will be kept in the strictest confidence and used for statistical purposes only.

24. Are you? *(please √one)* ☐ Male ☐ Female

25. What is your present employment status? *(please √one)*

☐ Employed, full-time ☐ Retired ☐ Unemployed ☐ Student

☐ Employed, part-time ☐ Self-employed ☐ Homemaker ☐ Other

26. Which of the following categories best describes your job or place of employment? *(please √one)*

☐ Agriculture ☐ Forestry

☐ Mining ☐ Manufacturing

☐ Tourism/Recreation ☐ Retail or Commercial Services

☐ Health/Medical ☐ Education

☐ Other *(please specify)*_____

27. Which of the following best describes the type of area where you have lived most of your life? *(please √one)*

☐ A major city or metropolitan area (over one million people) or its suburb
☐ A large city (100,000 to one million people) or its suburb
☐ A medium sized city (25,000 to 99,999 people) or its suburb
☐ A smaller city (5,000 to 24,999 people)
☐ A town or village (2,500 to 4,999 people)
☐ In the country or a very small town (under 2,500 people)
☐ No one choice describes where I have lived because I have moved often
☐ Other *(please list)*_____

28. Does anyone in your household suffer from respiratory or breathing problems? *(√ one)* ☐ No ☐ Yes

29. Do you live in an area served by a fire department? ☐ No ☐ Not Sure
☐ Yes→Are there hydrants? ☐ No ☐ Yes

30. What is the highest grade or number of years you completed in school? *(please circle the number)*

8 9 10 11 12 13 14 15 16 17 18 19 20

Jr. or High School College Graduate School

31. What was your household's before-tax annual income from all sources in 2000? *(please √one)*

☐ Less than $20,000 ☐ $40,000 to $59,999 ☐ $80,000 or more

☐ $20,000 to $39,999 ☐ $60,000 to $79,999 ☐ Choose not to answer

32. If you have any additional comments, please share them with us below.

Wildland Fire Study

A national survey about fire management in the wildland-urban interface

Focusing on residential areas in or near the Grand Mesa, Uncompahgre and Gunnison National Forests and Bureau of Land Management

Michigan State University and the United States Forest Service have formed a partnership to help forest fire managers understand your views on forest fires and forest management. Please answer all of the questions and add any additional comments in the space provided on the last page of the survey.

Please return the survey in the postage paid envelope when you are finished.

Thanks for your help!

Dr. Christine Vogt
Department of Park, Recreation and Tourism Resources
Michigan State University
172 Natural Resources Building
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Fire is an ever-present, natural part of the landscape. Your views on this topic are very important to fire managers as they decide how to protect homes and conserve our nation's forests and wildlife in the future. Your participation in this survey is important and greatly appreciated. Please keep in mind that we are interested in your opinions and ideas, there are no right or wrong answers to the following questions.

Section 1. These questions ask about the length and type of your residency in the forested areas Grand Mesa, Uncompahgre and Gunnison National Forests (referred as GMUG) and BLM land. The study areas include Delta, Montrose and Ouray counties.

1. Which statement best describes your residential status in or near the forested areas of the GMUG National Forests and BLM land for the address this survey was sent to? *(please √one)*
   - ☐ I am a full-time, permanent, year-round resident who owns my home
   - ☐ I am a part-time, seasonal resident who owns my home *(please √which one applies best)*
     - ☐ I am retired and only reside at this residence during certain seasons/time periods
     - ☐ I use the residence for vacations/weekend use
     - ☐ Something else *(please describe)*:_____
   - ☐ I am a landlord
   - ☐ None of the above describes my residential status *(please describe)*:___

2. What year did you acquire your residence described in question 1? *(fill in the year)*

3. How did you acquire your home in or near the forested areas of the GMUG National Forests and BLM land? *(please √one)*
   - ☐ Property was handed down or purchased from within the family
   - ☐ Property was purchased with the help of a realtor or sales office
   - ☐ Property was purchased directly from previous owner
   - ☐ Another way

   *(please describe)*_____

4. Are you or your spouse currently retired or planning to retire by 2005? *(please √one)*
   ☐ No ☐ Yes →What year did you or your spouse retire or plan to retire?*(fill in a year)*

   Yourself _____ Spouse _____

5. When you retire, do you plan to live full-time in or near the forested areas of the GMUG National Forests and BLM land? *(√one)*
   - ☐ Not applicable, already retired
   - ☐ Yes, I will live full-time in the forested areas of the National Forest
   - ☐ No, I will live in the forested areas of the Apalachicola part of the year and elsewhere the rest of the year

☐ No, I will not be living in this area *(please explain):*_____

6. What is the approximate size of your residential lot?*(Enter "0" if you own the house but not the land)*_____ x _____ ft or _____acres

7. Please describe your home in or near the forested areas of the GMUG National Forests and BLM land. *(√one)*

☐ Single family ☐ Mobile home
☐ Detached condo ☐ Other *(please describe)*_____
☐ Attached condo

8. How far is it from your home to the nearest land owned by the US Forest Service? *(please √one)*

☐ less than ½ mile ☐ 3 - 4 miles
☐ ½ mile - less than 1 mile ☐ 5 - 6 miles
☐ 1 - 2 miles ☐ Not sure

9. Do you or others in your household visit the GMUG National Forests and BLM land for recreation? *(please √one)*

☐ No, *skip to question 11* ☐ Yes → If Yes, how often?*(please √one)*
☐ Daily or weekly ☐ Couple times a month ☐ Couple times a year

10. Considering all of the outdoor recreation you have enjoyed over the past 12 months in the GMUG National Forests and BLM land, please list up to 3 activities that mean the most to you and others in your household.

_____ & _____ &

Section 2. Next we would like to know about your thoughts about and experiences with wildland fire.

11. How much did you think about the possibility of wildland fire in the forested areas of the GMUG National Forests and BLM land near your home at the following times? *(please circle one for each)*

At these times....	Not at All			Moderate Amount			A Great Deal	Not Sure
Before searching for a home	0	1	2	3	4	5	6	☐
During the home buying process	0	1	2	3	4	5	6	☐
After purchasing your home	0	1	2	3	4	5	6	☐

12. How knowledgeable do you feel you are on wildland fires in Florida? *(please circle one)*

Not at All Knowledgeable							**Very Knowledgeable**	**Not Sure**
0	1	2	3	4	5		6	☐

13. How would you evaluate your level of concern with the topics below? Circle the number that best fits your evaluation from "not at all concerned" to "very concerned." *(please circle one for each)*

How concerned are you about . . .	**Not at All Concerned**						**Very Concerned**
Wildland fires in Florida	0	1	2	3	4	5	6
Wildland fires resulting in loss of your home and possibly life	0	1	2	3	4	5	6
The level of attention by neighbors in regard to wildland fires	0	1	2	3	4	5	6
The level of attention by tourists/campers in regard to wildland fires	0	1	2	3	4	5	6

14. What level of consideration was given to the following features when <u>you purchased your house</u> in or near the forested areas of the GMUG National Forests and BLM land? *(please circle one for each)*

Property features.....	**Not a Conside -ration**						**Very Strong Conside- ration**	**Not Sure**
Nonflammable roofing materials	0	1	2	3	4	5	6	☐
Trees/vegetation cleared 30 ft around home	0	1	2	3	4	5	6	☐
Heated by source other than a wood burning stove	0	1	2	3	4	5	6	☐
Exterior propane tank at least 10 ft from home	0	1	2	3	4	5	6	☐
Wide roads and driveways to facilitate easy access for emergency vehicles	0	1	2	3	4	5	6	☐
Adequate street signs and address labeling for locating home in a fire	0	1	2	3	4	5	6	☐
Fire protection service (firefighters, fire trucks)	0	1	2	3	4	5	6	☐
Fire hydrants in the neighborhood	0	1	2	3	4	5	6	☐

Pipe system that can draw water from lake	0	1	2	3	4	5	6	☐
Lot had relatively few highly flammable trees	0	1	2	3	4	5	6	☐
Location of home in relation to past fires	0	1	2	3	4	5	6	☐

15. How would you rate your general attitude toward the use of these three fuel management approaches near your home? *(please circle one for each statement)*

Fuel Management Approaches:	**Extremely Negative**			**Neutral**			**Extremely Positive**
Prescribed burning *Definition: Resource managers may use planned fire to reduce fuels, regenerate desired plant or animal species, and promote ecological health*	-3	-2	-1	0	1	2	3
Mechanical fuel reduction *Definition: Resource managers may use chainsaws, brush mowers, and specialized machines to cut and remove shrubs, trees, and other fuels*	-3	-2	-1	0	1	2	3
Defensible space *Definition: Homeowners maintaining a fire-safe zone consisting of 30 feet around homes that is free of flammable vegetation*	-3	-2	-1	0	1	2	3

16. Which of the following experiences have you had at any time in your life? *(please √all that apply)*

☐ Been personally injured by a wildland fire
☐ Suffered property damage from a wildland fire

☐ A prescribed burn has occurred near my home

☐ Experienced smoke from a wildland fire

☐ Been required to remove flammable vegetation on my property

☐ Personally witnessed a wildland fire
☐ Felt fear or anxiety as a result of a wildland fire

☐ A mechanical removal of trees has occurred near my home

☐ Experienced a road closure due to a wildland fire

☐ Implemented a defensible space around my residence

☐ Friends, family or neighbors suffered property damage from a wildland fire

☐ Experienced discomfort or health problems from smoke caused by a wildland fire

☐ Other fire experience *(please describe)*:_____

17. Which of the following actions have you taken at any time in your life? *(please √ all that apply)*

- ☐ Asked local fire department about how to reduce risk of property damage from wildland fire
- ☐ Read information on home protection from wildland fires
- ☐ Attended a park or forest interpretive program about wildland fire
- ☐ Attended a public meeting about wildland fire
- ☐ Observed effects of wildland fires on forests
- ☐ Observed neighbors being careless with fire
- ☐ Worked with wildland fires as a part of my job or as a volunteer
- ☐ Asked forest rangers how to reduce risk of property damage caused by wildland fire
- ☐ Worked with local fire department on neighborhood and community fire protection
- ☐ Evacuated my home or office due to wildland fires
- ☐ Other fire related actions *(please describe)*: _____

18. If you have done anything to reduce the risk of losing your home to wildland fire, do you believe these efforts will protect your residence from a possible wildland fire? *(please circle one number)*

No			**Possibly**			**Absolutely**
0	1	2	3	4	5	6

19. Please respond to the following statements to the best of your ability by indicating whether you believe each is true, false, or you are not sure. *(please √one for each statement)*

	Generally True	**Generally False**	**Not Sure**
Wildland fires play a significant role in shaping many of the nation's forests.	☐	☐	☐
Humans cause most of the wildland fires in the U.S.	☐	☐	☐
Wildland fires can be an important force in controlling disease and insect outbreaks in forests and rangelands.	☐	☐	☐
Wildland fires kill the majority of large trees in the burned area.	☐	☐	☐
Many tree species require occasional fires so new trees can grow.	☐	☐	☐
Wildland fires kill a majority of the birds and mammals in a burned area.	☐	☐	☐

Section 3. This next section asks about your perceptions of and support for wildland fire and fuel management.

20. How likely do you think it is that prescribed burning will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			**Somewhat Likely**			**Certain**
Negatively impacts scenery	0	1	2	3	4	5	6
Creates more smoke in the short-term, but less smoke over time	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Allows fires to get out of control	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

21. How likely do you think it is that mechanical fuel reduction will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			**Somewhat Likely**			**Certain**
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

22. How likely do you think it is that defensible space will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement).*

	Zero Likelihood			**Somewhat Likely**			**Certain**
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

23. How would you rate your overall level of approval of the following fuel management approaches? *(please circle one number for each statement)*

	Strongly Disapprove			**Neither Approve/ Disapprove**			**Strongly Approve**
Prescribed burning	-3	-2	-1	0	1	2	3
Mechanical fuel reduction	-3	-2	-1	0	1	2	3
Defensible space	-3	-2	-1	0	1	2	3

Section 4. This final section asks for information about your household. This information will be kept in the strictest confidence and used for statistical purposes only.

24. Are you? *(please √one)* ☐ Male ☐ Female

25. What is your present employment status? *(please √one)*

☐ Employed, full-time ☐ Retired ☐ Unemployed ☐ Student

☐ Employed, part-time ☐ Self-employed ☐ Homemaker ☐ Other

26. Which of the following categories best describes your job or place of employment? *(please √one)*

☐ Agriculture ☐ Forestry

☐ Mining ☐ Manufacturing

☐ Tourism/Recreation ☐ Retail or Commercial Services

☐ Health/Medical ☐ Education

☐ Other *(please specify)*_____

27. Which of the following best describes the type of area where you have lived most of your life? *(please √one)*

☐ A major city or metropolitan area (over one million people) or its suburb
☐ A large city (100,000 to one million people) or its suburb
☐ A medium sized city (25,000 to 99,999 people) or its suburb
☐ A smaller city (5,000 to 24,999 people)
☐ A town or village (2,500 to 4,999 people)
☐ In the country or a very small town (under 2,500 people)
☐ No one choice describes where I have lived because I have moved often
☐ Other *(please list)*_____

28. Does anyone in your household suffer from respiratory or breathing problems? *(√ one)* ☐ No ☐ Yes

29. Do you live in an area served by a fire department? ☐ No ☐ Not Sure
☐ Yes➔Are there hydrants? ☐ No ☐ Yes

30. What is the highest grade or number of years you completed in school? *(please circle the number)*

8 9 10 11 12 13 14 15 16 17 18 19 20

Jr. or High School College Graduate School

31. What was your household's before-tax annual income from all sources in 2000? *(please √one)*

☐ Less than $20,000 ☐ $40,000 to $59,999 ☐ $80,000 or more

☐ $20,000 to $39,999 ☐ $60,000 to $79,999 ☐ Choose not to answer

32. If you have any additional comments, please share them with us below.

Wildland Fire Study

A national survey about fire management in the wildland-urban interface

Focusing on residential areas in or near the Apalachicola National Forest

Michigan State University and the United States Forest Service have formed a partnership to help forest fire managers understand your views on forest fires and forest management. Please answer all of the questions and add any additional comments in the space provided on the last page of the survey.

Please return the survey in the postage paid envelope when you are finished.

Thanks for your help!

Dr. Christine Vogt
Department of Park, Recreation and Tourism Resources
Michigan State University
172 Natural Resources Building
East Lansing, MI 48824-1222
517-353-0793 x128

Fire is an ever-present, natural part of the landscape. Your views on this topic are very important to fire managers as they decide how to protect homes and conserve our nation's forests and wildlife in the future. Your participation in this survey is important and greatly appreciated. Please keep in mind that we are interested in your opinions and ideas, there are no right or wrong answers to the following questions.

Section 1. These questions ask about the length and type of your residency in or near the forested areas of the Apalachicola National Forest. The study areas include Leon, Wakulla and Liberty counties. Use the map on the cover as a reference.

1. Which statement best describes your residential status in or near the forested areas of the Apalachicola National Forest for the address this survey was sent to? *(please √one)*
   - ☐ I am a full-time, permanent, year-round resident who owns my home
   - ☐ I am a part-time, seasonal resident who owns my home *(please √which one applies best)*
     - ☐ I am retired and only reside at this residence during certain seasons/time periods
     - ☐ I use the residence for vacations/weekend use
     - ☐ Something else *(please describe)*:_____
   - ☐ I am a landlord
   - ☐ None of the above describes my residential status *(please describe)*:___

2. What year did you acquire your residence described in question 1? *(fill in the year)*

3. How did you acquire your home in or near the forested areas of the Apalachicola National Forest? *(please √one)*
   - ☐ Property was handed down or purchased from within the family
   - ☐ Property was purchased with the help of a realtor or sales office
   - ☐ Property was purchased directly from previous owner
   - ☐ Another way

   *(please describe)*_____

4. Are you or your spouse currently retired or planning to retire by 2005? *(please √one)*
   - ☐ No ☐ Yes →What year did you or your spouse retire or plan to retire?*(fill in a year)*

     Yourself _____ Spouse _____

5. When you retire, do you plan to live full-time in or near the forested areas of the Apalachicola National Forest? *(√one)*
   - ☐ Not applicable, already retired
   - ☐ Yes, I will live full-time in the forested areas of the National Forest

☐ No, I will live in the forested areas of the Apalachicola part of the year and elsewhere the rest of the year

☐ No, I will not be living in this area *(please explain):*_____

6. What is the approximate size of your residential lot?*(Enter "0" if you own the house but not the land)*_____ x _____ ft or _____acres

7. Please describe your home in or near the forested areas of the Apalachicola National Forest. *(√one)*

☐ Single family ☐ Mobile home
☐ Detached condo ☐ Other *(please describe)*_____
☐ Attached condo

8. How far is it from your home to the nearest land owned by the US Forest Service? *(please √one)*

☐ less than ½ mile ☐ 3 - 4 miles
☐ ½ mile - less than 1 mile ☐ 5 - 6 miles
☐ 1 - 2 miles ☐ Not sure

9. Do you or others in your household visit the Apalachicola National Forest for recreation? *(please √one)*

☐ No, *skip to question 11* ☐ Yes → If Yes, how often?*(please √one)*
☐ Daily or weekly ☐ Couple times a month ☐ Couple times a year

10. Considering all of the outdoor recreation you have enjoyed over the past 12 months in the Apalachicola National Forest, please list up to 3 activities that mean the most to you and others in your household.

_____ & _____ &

Section 2. Next we would like to know about your thoughts about and experiences with wildland fire.

11. How much did you think about the possibility of wildland fire in the forested areas of the Apalachicola National Forest near your home at the following times? *(please circle one for each)*

At these times....	Not at All			Moderate Amount			A Great Deal	Not Sure
Before searching for a home	0	1	2	3	4	5	6	☐
During the home buying process	0	1	2	3	4	5	6	☐
After purchasing your home	0	1	2	3	4	5	6	☐

12. How knowledgeable do you feel you are on wildland fires in Florida? *(please circle one)*

Not at All Knowledgeable							**Very Knowledgeable**	**Not Sure**
0	1	2	3	4	5		6	☐

13. How would you evaluate your level of concern with the topics below? Circle the number that best fits your evaluation from "not at all concerned" to "very concerned." *(please circle one for each)*

How concerned are you about . . .	**Not at All Concerned**						**Very Concerned**
Wildland fires in Florida	0	1	2	3	4	5	6
Wildland fires resulting in loss of your home and possibly life	0	1	2	3	4	5	6
The level of attention by neighbors in regard to wildland fires	0	1	2	3	4	5	6
The level of attention by tourists/campers in regard to wildland fires	0	1	2	3	4	5	6

14. What level of consideration was given to the following features when <u>you purchased your house</u> in or near the forested areas of the Apalachicola National Forest? *(please circle one for each)*

Property features.....	**Not a Conside -ration**						**Very Strong Conside-ration**	**Not Sure**
Nonflammable roofing materials	0	1	2	3	4	5	6	☐
Trees/vegetation cleared 30 ft around home	0	1	2	3	4	5	6	☐
Heated by source other than a wood burning stove	0	1	2	3	4	5	6	☐
Exterior propane tank at least 10 ft from home	0	1	2	3	4	5	6	☐
Wide roads and driveways to facilitate easy access for emergency vehicles	0	1	2	3	4	5	6	☐
Adequate street signs and address labeling for locating home in a fire	0	1	2	3	4	5	6	☐
Fire protection service (firefighters, fire trucks)	0	1	2	3	4	5	6	☐
Fire hydrants in the neighborhood	0	1	2	3	4	5	6	☐

Pipe system that can draw water from lake	0	1	2	3	4	5	6	☐
Lot had relatively few highly flammable trees	0	1	2	3	4	5	6	☐
Location of home in relation to past fires	0	1	2	3	4	5	6	☐

15. How would you rate your general attitude toward the use of these three fuel management approaches near your home? *(please circle one for each statement)*

Fuel Management Approaches:	**Extremely Negative**			**Neutral**			**Extremely Positive**
Prescribed burning *Definition: Resource managers may use planned fire to reduce fuels, regenerate desired plant or animal species, and promote ecological health*	-3	-2	-1	0	1	2	3
Mechanical fuel reduction *Definition: Resource managers may use chainsaws, brush mowers, and specialized machines to cut and remove shrubs, trees, and other fuels*	-3	-2	-1	0	1	2	3
Defensible space *Definition: Homeowners maintaining a fire-safe zone consisting of 30 feet around homes that is free of flammable vegetation*	-3	-2	-1	0	1	2	3

16. Which of the following experiences have you had at any time in your life? *(please √all that apply)*

☐ Been personally injured by a wildland fire
☐ Suffered property damage from a wildland fire

☐ A prescribed burn has occurred near my home

☐ Experienced smoke from a wildland fire

☐ Been required to remove flammable vegetation on my property

☐ Personally witnessed a wildland fire
☐ Felt fear or anxiety as a result of a wildland fire

☐ A mechanical removal of trees has occurred near my home

☐ Experienced a road closure due to a wildland fire

☐ Implemented a defensible space around my residence

☐ Friends, family or neighbors suffered property damage from a wildland fire

☐ Experienced discomfort or health problems from smoke caused by a wildland fire

☐ Other fire experience *(please describe)*:_____

17. Which of the following actions have you taken at any time in your life? *(please √ all that apply)*

- ☐ Asked local fire department about how to reduce risk of property damage from wildland fire
- ☐ Read information on home protection from wildland fires
- ☐ Attended a park or forest interpretive program about wildland fire
- ☐ Attended a public meeting about wildland fire
- ☐ Observed effects of wildland fires on forests
- ☐ Observed neighbors being careless with fire
- ☐ Worked with wildland fires as a part of my job or as a volunteer
- ☐ Asked forest rangers how to reduce risk of property damage caused by wildland fire
- ☐ Worked with local fire department on neighborhood and community fire protection
- ☐ Evacuated my home or office due to wildland fires
- ☐ Other fire related actions *(please describe)*: _____

18. If you have done anything to reduce the risk of losing your home to wildland fire, do you believe these efforts will protect your residence from a possible wildland fire? *(please circle one number)*

No			**Possibly**			**Absolutely**
0	1	2	3	4	5	6

19. Please respond to the following statements to the best of your ability by indicating whether you believe each is true, false, or you are not sure. *(please √one for each statement)*

	Generally True	**Generally False**	**Not Sure**
Wildland fires play a significant role in shaping many of the nation's forests.	☐	☐	☐
Humans cause most of the wildland fires in the U.S.	☐	☐	☐
Wildland fires can be an important force in controlling disease and insect outbreaks in forests and rangelands.	☐	☐	☐
Wildland fires kill the majority of large trees in the burned area.	☐	☐	☐
Many tree species require occasional fires so new trees can grow.	☐	☐	☐
Wildland fires kill a majority of the birds and mammals in a burned area.	☐	☐	☐

Section 3. This next section asks about your perceptions of and support for wildland fire and fuel management.

20. How likely do you think it is that prescribed burning will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			Somewhat Likely			Certain
Negatively impacts scenery	0	1	2	3	4	5	6
Creates more smoke in the short-term, but less smoke over time	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Allows fires to get out of control	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

21. How likely do you think it is that mechanical fuel reduction will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement)*

	Zero Likelihood			Somewhat Likely			Certain
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

22. How likely do you think it is that defensible space will achieve the following outcomes? Please circle a response that best fits your view of likelihood ranging from "0" for zero likelihood to "6" for certain. *(please circle one number for each statement).*

	Zero Likelihood			**Somewhat Likely**			**Certain**
Negatively impacts scenery	0	1	2	3	4	5	6
Uses commercial logging	0	1	2	3	4	5	6
Saves money by reducing the cost of fighting an uncontrolled wildland fire	0	1	2	3	4	5	6
Restores the forest to a more natural condition	0	1	2	3	4	5	6
Improves conditions for wildlife	0	1	2	3	4	5	6
Reduces the acres burned in unplanned wildland fires	0	1	2	3	4	5	6

23. How would you rate your overall level of approval of the following fuel management approaches? *(please circle one number for each statement)*

	Strongly Disapprove			**Neither Approve/ Disapprove**			**Strongly Approve**
Prescribed burning	-3	-2	-1	0	1	2	3
Mechanical fuel reduction	-3	-2	-1	0	1	2	3
Defensible space	-3	-2	-1	0	1	2	3

Section 4. This final section asks for information about your household. This information will be kept in the strictest confidence and used for statistical purposes only.

24. Are you? *(please √one)* ☐ Male ☐ Female

25. What is your present employment status? *(please √one)*

☐ Employed, full-time ☐ Retired ☐ Unemployed ☐ Student

☐ Employed, part-time ☐ Self-employed ☐ Homemaker ☐ Other

26. Which of the following categories best describes your job or place of employment? *(please √one)*

☐ Agriculture ☐ Forestry

☐ Mining ☐ Manufacturing

☐ Tourism/Recreation ☐ Retail or Commercial Services

☐ Health/Medical ☐ Education

☐ Other *(please specify)*_____

27. Which of the following best describes the type of area where you have lived most of your life? *(please √one)*

☐ A major city or metropolitan area (over one million people) or its suburb
☐ A large city (100,000 to one million people) or its suburb
☐ A medium sized city (25,000 to 99,999 people) or its suburb
☐ A smaller city (5,000 to 24,999 people)
☐ A town or village (2,500 to 4,999 people)
☐ In the country or a very small town (under 2,500 people)
☐ No one choice describes where I have lived because I have moved often
☐ Other *(please list)*_____

28. Does anyone in your household suffer from respiratory or breathing problems? *(√ one)* ☐ No ☐ Yes

29. Do you live in an area served by a fire department? ☐ No ☐ Not Sure
☐ Yes➔Are there hydrants? ☐ No ☐ Yes

30. What is the highest grade or number of years you completed in school? *(please circle the number)*

8 9 10 11 12 13 14 15 16 17 18 19 20

Jr. or High School College Graduate School

31. What was your household's before-tax annual income from all sources in 2000? *(please √one)*

☐ Less than $20,000 ☐ $40,000 to $59,999 ☐ $80,000 or more

☐ $20,000 to $39,999 ☐ $60,000 to $79,999 ☐ Choose not to answer

32. If you have any additional comments, please share them with us below.

APPENDIX B

MAIL SURVEY FIRST COVER LETTER

Date

Name
Address
City, State, Zip

Dear :

In recent years wildfires have occurred across the United States and pose a potential threat to communities nationwide. Fire departments across the nation are encountering increasingly complex incidents that involve wildfires and communities. These urban fire departments are best prepared to fight fires in residential communities, and face new challenges when homes are located in wildland or forested areas. The wildland-urban interface is a growing issue as more people move to rural areas.

Michigan State University has partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the San Bernardino National Forest is fire-prone and located near major metropolitan areas, it has been chosen to represent the wildland-urban interface in California. We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

Your comments are valuable to our study. Your responses will be kept confidential and your name will not be associated with any results. We are offering the chance to win one of six $25 Walmart gift certificates. Your chances of winning are 1 out of 250. Winners will be notified by November 28, 2001. Your privacy will be protected to the maximum extent allowable by law. If you have any questions regarding your participation in this study, please contact Christine Vogt at 517-353-0793 Ext 128. If you have questions about your rights as a human subject of research, please contact the University Committee on Research Involving Human Subjects, Ashir Kumar, M.D., Chair at 517-355-2180 or ucrihs@msu.edu.

Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.	Chuck Nelson, Ph.D.	Stan Cindrity
Assistant Professor	Associate Professor	Graduate Student

Enclosures

Date

Name
Address
City, State, Zip

Dear :

In recent years wildfires have occurred across the United States and pose a potential threat to communities nationwide. Fire departments across the nation are encountering increasingly complex incidents that involve wildfires and communities. These urban fire departments are best prepared to fight fires in residential communities, and face new challenges when homes are located in wildland or forested areas. The wildland-urban interface is a growing issue as more people move to rural areas.

Michigan State University has partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the Grand Mesa, Uncompahgre and Gunnison National Forests and Bureau of Land Management areas are fire-prone and located near urban areas, they have been chosen to represent the wildland-urban interface in Colorado. We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

Your comments are valuable to our study. Your responses will be kept confidential and your name will not be associated with any results. We are offering the chance to win one of four $25 Walmart gift certificates. Your chances of winning are 1 out of 250. Winners will be notified by November 28, 2001. Your privacy will be protected to the maximum extent allowable by law. If you have any questions regarding your participation in this study, please contact Christine Vogt at 517-353-0793 Ext 128. If you have questions about your rights as a human subject of research, please contact the University Committee on Research Involving Human Subjects, Ashir Kumar, M.D., Chair at 517-355-2180 or ucrihs@msu.edu.

Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.	Chuck Nelson, Ph.D.	Stan Cindrity
Assistant Professor	Associate Professor	Graduate Student

Enclosures

November 30, 2001

Name
Address
City, State, Zip

Dear :

In recent years wildfires have occurred across the United States and pose a potential threat to communities nationwide. Fire departments across the nation are encountering increasingly complex incidents that involve wildfires and communities. These urban fire departments are best prepared to fight fires in residential communities, and face new challenges when homes are located in wildland or forested areas. The wildland-urban interface is a growing issue as more people move to rural areas.

Michigan State University partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. **Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the Apalachicola National Forest is fire-prone and located near urban areas, the Forest has been chosen to represent the wildland-urban interface in Florida.** We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

Your comments are valuable to our study. Your responses will be kept confidential and your name will not be associated with any results. We are offering the chance to win one of four $25 Lowe's gift certificates. Your chances of winning are 1 out of 250. Winners will be notified by December 28, 2001. Your privacy will be protected to the maximum extent allowable by law. If you have any questions regarding your participation in this study, please contact Christine Vogt at 517-353-0793 Ext 128. If you have questions about your rights as a human subject of research, please contact the University Committee on Research Involving Human Subjects, Ashir Kumar, M.D., Chair at 517-355-2180 or ucrihs@msu.edu.

Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.	Chuck Nelson, Ph.D.	Stan Cindrity
Assistant Professor	Associate Professor	Graduate Student

Enclosures

APPENDIX C

MAIL SURVEY REMINDER POST CARD

Hello,

Recently, we sent you a survey about wildland fire management. The area we are studying is either where you live permanently or own a seasonal home. If you have already returned the survey, thank you for your timely response. We appreciate your time and effort.

If you have not yet sent the survey back in the prepaid envelope, please take some time now to complete the survey. Your response is very important for the completion of our study and accurate representation of residents who live near the national forest.

Once again, thank you for your help in completing this research. If you have any questions, please do not hesitate to call me at 517-353-0793 X128. Thanks again for your help!

Sincerely,

Christine Vogt, Michigan State University

APPENDIX D

MAIL SURVEY SECOND COVER LETTER

November 30, 2001

Name
Address
City, State, Zip

Dear :

Recently you should have received a survey in the mail from Michigan State University. We have not yet received your completed survey and are very interested in your opinions. If you mailed the survey already we must not have received it when this letter was written. If you have not completed the survey, please take the time to complete the enclosed survey. **Please consider returning the survey to us by December 15, 2001.**

In recent years wildfires have occurred across the United States and pose a potential threat to communities nationwide. Fire departments across the nation are encountering increasingly complex incidents that involve wildfires and communities. These urban fire departments are best prepared to fight fires in residential communities, and face new challenges when homes are located in wildland or forested areas. The wildland-urban interface is a growing issue as more people move to rural areas.

Michigan State University partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. **Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the San Bernardino National Forest is fire-prone and located near major metropolitan areas, it has been chosen to represent the wildland-urban interface in California.** We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

Your comments are valuable to our study. Your responses will be kept confidential and your name will not be associated with any results. We are offering the chance to win one of six $25 Walmart gift certificates. Your chances of winning are 1 out of 250. We extended our notification date to December 18, 2001 from November 28, 2001. Your privacy will be protected to the maximum extent allowable by law. If you have any questions regarding your participation in this study, please contact Christine Vogt at 517-353-0793 Ext 128. If you have questions about your rights as a human subject of research, please contact the University Committee on Research Involving Human Subjects, Ashir Kumar, M.D., Chair at 517-355-2180 or ucrihs@msu.edu.

Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.
Assistant Professor and Project Leader

Enclosures

November 30, 2001

Name
Address
City, State, Zip

Dear :

Recently you should have received a survey in the mail from Michigan State University. We have not yet received your completed survey and are very interested in your opinions. If you mailed the survey already we must not have received it when this letter was written. If you have not completed the survey, please take the time to complete the enclosed survey. **Please consider returning the survey to us by December 15, 2001.**

In recent years wildfires have occurred across the United States and pose a potential threat to communities nationwide. Fire departments across the nation are encountering increasingly complex incidents that involve wildfires and communities. These urban fire departments are best prepared to fight fires in residential communities, and face new challenges when homes are located in wildland or forested areas. The wildland-urban interface is a growing issue as more people move to rural areas.

Michigan State University partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. **Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the Grand Mesa, Uncompahgre and Gunnison National Forests and Bureau of Land Management areas are fire-prone and located near urban areas, they have been chosen to represent the wildland-urban interface in Colorado.** We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

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Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.
Assistant Professor and Project Leader

Enclosures

November 30, 2001

Name
Address
City, State, Zip

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Michigan State University partnered with the United States Forest Service to conduct a national study to understand residents' attitudes and perceptions toward fire and forest management within the wildland-urban interface. **Communities and their residents in areas near National Forests in California, Colorado, and Florida were selected to participate in this national study. Because the Apalachicola National Forest is fire-prone and located near urban areas, it has been chosen to represent the wildland-urban interface in Colorado.** We are interested in your level of concern towards this issue, attitudes toward fire and forest management, and if you have implemented improvements to your home or property to minimize the potential risk of fire, property loss and personal injury.

This survey should take you approximately 15 minutes to complete. You indicate your voluntary agreement to participate by completing and returning this questionnaire. However, if you choose not to participate, you will not suffer any penalty. When you have completed the questionnaire, please mail it back to us in the postage paid envelope provided. If you presently have your home listed for sale, we encourage you to complete the survey.

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Thanks for your help.

Sincerely,

Christine Vogt, Ph.D.
Assistant Professor and Project Leader

Enclosures

APPENDIX E

DEMOGRAPHIC FREQUENCIES

Table 18. Gender of Respondents

	California		Colorado		Florida	
Gender	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Male	61%	53%	68%	76%	79%	70%
Female	39	47	32	24	21	30

Table 19. Employment Status of Respondents

	California		Colorado		Florida	
Employment Status	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Employed, part-time or full time	46%	42%	41%	37%	45%	52%
Self-employed or retired	51	51	56	60	55	45
Homemaker	2	2	3	1	0	2
Unemployed	1	2	0	1	0	0
Student	0	1	0	0	0	0
Other	0	2	0	1	0	1

Table 20. Respondents' Career Type

	California		Colorado		Florida	
Career Type	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Agriculture	0	1%	9%	13%	6%	4%
Mining	1%	0	0	2	0	2
Tourism/recreation	3	5	4	5	2	1
Health/medical	7	7	16	11	10	6
Forestry	1	1	0	1	2	2
Manufacturing	9	1	9	6	4	2
Retail	15	21	12	12	22	18
Education	20	14	16	11	18	12
Other	44	50	34	39	36	53

Table 21. Respondents' Residence History

	California		Colorado		Florida	
Size of City	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Other	1%	4%	2%	2%	0	0
No one choice	1	8	3	6	0	4%
Under 2,500	1	6	15	37	18%	36
2,500 to 4,999	2	16	2	9	8	7
5,000 to 24,999	8	12	11	13	19	7
25,000 to 99,999	25	23	15	8	21	22
100,000 to one million people	17	18	23	10	19	18
Over one million people	45	13	29	15	15	6

Table 22. Respondents' Reported Breathing or Respiratory Problems

	California		Colorado		Florida	
Breathing or respiratory condition?	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Condition	25%	27%	20%	21%	28%	30%
No condition	75	73	80	79	72	70

Table 23. Respondents' Perceived Area Served by a Fire Department

	California		Colorado		Florida	
	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Served by a fire department	98%	100%	98%	99%	98%	98%
Not served	1	0	1	1	1	1
Not Sure	1	0	1	0	1	1

Table 24. Fire Hydrant Location by Respondents' Home

	California		Colorado		Florida	
	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Hydrants available	96%	93%	87%	63%	58%	49%
Not available	4	7	13	37	42	51

Table 25. Educational Level of Respondents

	California		Colorado		Florida	
Education completed	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Jr. or High School	21%	16%	11%	23%	30%	44%
College	52	61	47	44	32	43
Graduate School	27	23	42	33	38	13

Table 26. Household Income of Respondents

	Colorado		California		Florida	
Income	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent
Less than $20,000	5%	7%	2%	9%	4%	7%
$20,000-$39,999	16	21	6	21	7	24
$40,000-$59,999	16	22	14	30	22	27
$60,000-$79,999	17	21	20	17	17	21
$80,000 or more	46	29	58	23	50	21