

The Influence of Environmental Value Orientation and Climate Change Beliefs  
on the Firewise Behaviors of Central Oregon Residents

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## ABSTRACT

Over the past two decades, the western United States has experienced many of the costliest and most severe wildfires in history. To mitigate the effects of the growing threats posed by wildfires, residents in at-risk communities are encouraged to protect their homes and property by adopting Firewise recommendations. This article examines the influence of environmental value orientation and climate change beliefs on resident's decisions to participate in Firewise behaviors. The population was drawn from six counties in Central Oregon that are prone to wildfires. Using previous empirical research and the tenets of the cognitive hierarchy, a path model that connected environmental value orientation, climate change beliefs, risk perceptions and Firewise behaviors was created. Multiple path analysis models determined that environmental value orientation significantly influenced climate change beliefs, the belief that climate change caused wildfires made one more likely to participate in Firewise behaviors, and the relationship between beliefs and behaviors was partially mediated by risk perception. These results confirmed the hypotheses and were consistent with both previous literature and the theoretical assumptions of the cognitive hierarchy.

**KEYWORDS:** climate change, Firewise, wildfire, cognitive hierarchy, values, beliefs

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# The Influence of Environmental Value Orientation and Climate Change Beliefs on the Firewise Behaviors of Central Oregon Residents

## Introduction

Over the last several decades, a confluence of events has necessitated the creation of a coordinated and comprehensive strategy concerning wildfires. Years of complete fire suppression that allowed for the buildup of fuels combined with hotter and dryer conditions caused by climate change have contributed to growing concerns about the potential for more frequent and severe wildfires. At the same time, more people are migrating into wildfire-prone areas where urban development meets public wildlands known as the wildland-urban interface (WUI). Often, these new residents have not been exposed to wildfires and will not understand the threats associated with living near a wildland area. In contrast, some people who have lived in these fire-prone areas for an extended period of time have grown accustomed to being protected from wildfires by the government and may no longer perceive any personal responsibilities in regards to wildfire mitigation (Brenkert-Smith et al., 2006). The costs associated with fighting wildfires in the WUI have also increased substantially in recent years and are predicted to double or even quadruple by the year 2025 (Gude et al., 2009).

A potential solution to this problem is the Firewise Communities program developed by the National Fire Protection Association with the purpose of encouraging the public to take responsibility for protecting their homes and communities. This educational program “teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses” (Firewise Communities, 2011a, para. 3). This program has been successful in encouraging residents in hundreds of communities to



think about and participate in a number of wildfire mitigation strategies designed to save lives and property (Firewise Communities, 2011b). However, there are many people who are either unaware of the threats posed by wildfire or do not know that there are individual behaviors that can help to reduce the threats (Kyle et al., 2010). There are a number of reasons why a person may not participate in wildfire mitigation, or Firewise, behaviors, and a better understanding of those reasons could be valuable for natural resources managers trying to increase public participation in these activities.

The purpose of this article was to look at the wildfire mitigation behaviors of Central Oregon residents and determine the influence that values and beliefs had on residents' decisions to participate in those activities. With scientists reaching a consensus about the existence of climate change and its effects already being felt, this article hoped to determine whether believing in climate change and its effects was directly influencing wildfire mitigation behavior. Climate change remains a controversial issue and many people are unaware of the connection between climate change and wildfires. Previous research has yet to determine whether this belief will influence behavior and to what extent that influence might be. This study used the cognitive hierarchy as a theoretical framework to provide some insight into the relationship between climate change beliefs and wildfire mitigation behaviors. Based on this framework, it was hypothesized that environmental value orientation would directly influence climate change beliefs. However, it was assumed that believing in climate change would not directly influence a person's mitigation behaviors unless that person also believed that climate change contributed to wildfires. Furthermore, risk perception was predicted to partially mediate the relationship between climate change beliefs and Firewise behavior.

## **Background**

### **Consensus on Climate Change**

In 2007, the Intergovernmental Panel on Climate Change produced its fourth assessment report (AR4). This report determined that human activity was contributing to global climate change and that the physical and biological impacts were already being felt. The AR4 was important not only because of the conclusions it reached regarding the past, present and future impacts of climate change but because it was the first time that the scientific community had reached a consensus on the issue. Some of the robust findings of the AR4 were that global temperatures would continue to rise over the next two decades and “induce many changes in the global climate system during the 21<sup>st</sup> century that would very likely be larger than those observed during the 20th century” (IPCC, 2007 p. 45). With the scientific community now in agreement that climate change was happening, the AR4 concluded that immediate action would need to be taken to mitigate and adapt to future changes.

The AR4 also identified some of the regions and ecosystems that would be the most susceptible to these changes, which included areas with geographic characteristics similar to those found in the western United States. Of course, not all regions would be affected by the changes equally and some might not be affected at all. Across the western United States, models predicted that most areas would become hotter and drier with temperatures increasing between 2° to 5° C and precipitation dropping by as much as 15% (Rousteenoja et al., 2003; Westerling et al., 2006).

## Climate Change and Wildfire

The effects of climate change would be the most dramatic during the summer months when the risk of wildfire is the greatest. Higher temperatures and less precipitation could also cause snowpacks to melt one to four weeks earlier than usual producing a longer fire season. Research has shown that snowpacks are melting earlier than they have in the past, which has contributed to the large fires that have occurred in the past few decades (Mote et al., 2005; Westerling, 2006). Over the last 20 years, the fire season has expanded by 78 days when compared to the average season length between 1970 and 1986. During that same time, the amount of forest that was burned was six times larger. Much of the increase was in high elevation forests that were not affected by changes in management practices or other human behaviors (Bachelet and Lenihan, 2007). The longer fire season also allows more time for woody debris to accumulate on the ground. The combination of these critical factors, earlier snowmelt, longer fire season, higher summer temperatures, less precipitation and more fuel, creates a situation that is much more likely to produce wildfires (Running, 2006).

In 1988, the Yellowstone fires brought national attention to the issue of wildfires. The fires that burned in Yellowstone National Park were the largest that the park had experienced in its history. They lasted for three months and burned over 600,000 ha in the greater Yellowstone region (Running, 2006). Analysis of the fires strongly suggested that the severity of the fires was a direct result of the climate conditions of the time (Turner et al., 2003). The region had experienced drought conditions for the previous 12 years, and there was a below average snowpack following the winter of 1988. Things worsened

during an unusually hot, dry, and windy summer that resulted in extreme burning conditions throughout the park (Schoennagel et al., 2004). The fires were so extensive that despite \$120 million in investments and the suppression efforts of 25,000 firefighters, it was not until the winter snows began to fall that the fires were finally extinguished (Running, 2006). Several other major fires have resulted from similar conditions including the 2002 Hayman fire in Colorado that followed a five year drought and a May snowpack that was 50% lower than normal and the 2002 Rodeo-Chediski fire in northern Arizona that followed four years of drought and the driest month of May that Arizona had experienced in 108 years (Schoennagel et al., 2004). Arizona, New Mexico and Texas have all experienced some of the worst wildfires in their state's histories in 2011 while simultaneously experiencing extreme drought conditions and setting records for high temperatures and low precipitation (NOAA, 2011).

### **Firewise Communities**

The Firewise Communities program was developed by the National Fire Protection Association (NFPA) as a way to encourage homeowners, property planners and developers, community leaders, and firefighters to develop local solutions to problems caused by wildfire. The program is managed by the NFPA under the direction of the National Wildfire Coordinating Group's Wildland Urban Interface Working Team (WUIWT), which is comprised of state and federal agencies including the Forest Service, U.S. Department of the Interior, U.S. Fire Administration, as well as several others. The goal of this program is to save lives and property by educating people about how to live with and adapt to wildfires. This is accomplished using a number of methods including Firewise Communities

Workshops, public education and an interactive website. The workshops are a series of seminars carried about by professionals from various backgrounds to educate individuals about the different Firewise behaviors and how they can best be implemented in the local community. There is no universal plan for protecting communities from wildfire because each community has unique characteristics that require individual attention. Each community develops its own protection plan in collaboration with community leaders, agency personnel and professionals and is responsible for its implementation. To date, more than 700 communities in 40 states have been recognized as Firewise Communities/USA sites (Firewise Communities, 2011b).

### **Firewise Behaviors**

In addition to participating in community efforts to protect their homes, the Firewise Communities program encourages homeowners to participate in a number of individual behaviors that are also designed to protect homes from wildfires. The primary behaviors focus on landscaping and construction with emergency and evacuation planning recommended for worst-case scenarios. Firewise landscape designs stress fuel reduction in the area immediately surrounding the home. The ultimate goal for any Firewise landscaping project is creating a defensible space. Defensible space is defined as “the area around a building that has been significantly modified to reduce a wildfire’s intensity just enough to prevent the fire from igniting the house. It can also help prevent a house fire from spreading to surrounding vegetation” (Slack, 2000, p. 12). Within a 200 foot perimeter of the home called the home ignition zone are three separate zones (Figure 1), each with its own specific recommendations for reducing or eliminating ignition hazards.

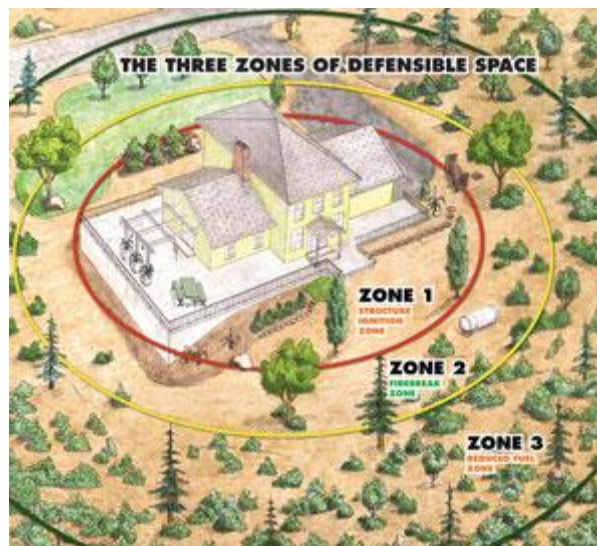
The zones nearest the home require the most landscaping and maintenance. Recommendations include thinning and spacing bushes and trees, removing dead leaves, needles and branches, using rock and brick near the home's foundation rather than mulch, creating fuel breaks such as driveways or paths, as well as many others.

When constructing or renovating a home using Firewise techniques, homeowners are encouraged to plan their construction in consideration of the home's immediate surroundings. Homes that are exposed to more fuels and combustible materials are going to be more vulnerable to wildfires and will have a greater need for nonflammable and fire resistant building materials. The most important places to use fire resistant materials are on the roof, exterior walls, and attachments such as decks and porches (Slack, 2000). The Firewise Communities program offers guides and videos instructing homeowners about which materials, plants, and landscape designs will make their homes safest from wildfires.

## Literature Review

### Wildfire Mitigation Decisions

Despite the risks posed by wildfires, many homeowners do not participate in Firewise behaviors or any other recommended wildfire mitigation behaviors (Brenkert-Smith et al., 2006). This has become an especially pertinent issue as more people from urban areas move into rural areas known as the wildland-urban interface (WUI). The WUI



**Figure 1.** Three Zones of Defensible Space.  
*Source:* The Napa Communities Firewise Foundation

is the area of transition between urban development and undeveloped wildlands (Theobald and Romme, 2007). It is also the area where wildfires are most likely to threaten homes and where protecting structures is the most difficult (Radeloff et al, 2005). The WUI grew rapidly between 1952 and 1997 and is expected to grow by an additional 3.1% to 8.1% by 2050 (Nowak and Walton, 2005) with much of the expansion taking place in the intermountain west (Theobald and Romme, 2007).

As more people choose to live in the WUI, individual wildfire mitigation efforts will become an increasingly important and necessary component of wildfire management. To develop effective wildfire mitigation policies, it is necessary to understand the reasons why homeowners decide whether or not to participate in these behaviors independently. Few studies have been conducted that have looked specifically at the relationship between climate change and wildfire mitigation behaviors. A study by Schulte and Miller (2010), for example, examined relationships between a person's understanding of the effects of climate change on their perception of risk and on their participation in mitigation behaviors. The authors found that there was a significant and positive relationship between the belief that the effects of climate change would increase the risk of wildfires and overall risk perception. However, although many respondents reported that the effects of climate change were a motivating reason behind their mitigation behaviors, the relationship between this variable and mitigation efforts was only marginally significant. These findings indicate that belief in climate change and its effects may increase a person's level of risk perception but does not appear to be enough reason to participate in wildfire mitigation activities.

A study by Brenkert et al. (2006) asked residents of five Colorado WUI communities what they thought the most important issues were regarding wildfire, wildfire risk, and wildfire mitigation. They found that the decision-making process was complex and involved several considerations including social context, perceptions of the environment and perceptions of risk reduction options. At the social level, some residents would make decisions based on community expectations. The community would have a particular focus and that discourse would be reflected in the individuals' actions. Others would make their decisions based on informal social interactions with their friends and neighbors and others would negotiate outcomes within the household. Another factor that residents' considered was the biophysical environment surrounding their homes. A common sentiment was that the proximity of other private and public unmitigated lands would render any personal efforts fruitless in the face of a severe wildfire. Finally, respondents reported a variety of opinions about which mitigation strategy would be the most effective for their particular landscape. Some preferred to be proactive and focused on fuel treatments and fire resistant building materials whereas others thought that emergency preparedness strategies would work best. Cost and time were often cited as reasons why one option was preferred over another, and low-cost and low-effort options were the most common behaviors carried out by respondents.

Other studies have attempted to determine support for mitigation practices by using a combination of underlying factors (Kneeshaw et al., 2004; Absher and Vaske, 2006; Absher and Vaske, 2007). Their results showed that a combination of influences including sociodemographics, situational variables and psychological variables affected support for a specific policy although not each variable had an equal effect. Sociodemographics generally



had a weak relationship with mitigation behaviors, whereas situational and psychological variables had strong relationships, particularly with actions related to defensible space.

Research has also been conducted on a number of specific influences and barriers to participation. Kyle et al. (2010) looked at the influence of home and community attachment on Firewise behavior. They found that people who had the strongest attachment to their homes were most likely to engage in activities around their homes and those with the strongest attachment to their communities were mostly likely to participate in community-based activities. These findings were consistent with other research showing that attachment to a place or object is likely to translate into a desire to protect that resource (Payton et al., 2005; Theodori, 2004). A study by Bright and Burtz (2006b) looked at the differences between full-time and seasonal residents in the WUI and found that although both groups generally supported Firewise activities, the level of support was consistently higher among full-time residents. These findings reinforce the argument that wildfire mitigation policies will need to be multifaceted and allow for specific alterations depending on the individuals and their communities.

One area of research that has received considerable attention is the effect of risk perception on mitigation behaviors. The literature has found that risk perception generally contributes to mitigation behavior, but it is usually not the primary reason why a person chooses to participate. Typically, risk perception along with a combination of factors including land use values, place attachment, expected efficacy of mitigation options, and several other components will contribute to the decision-making process (Cortner and Gale, 1990; Lindell and Prater, 2000, Gordon et al., 2010; Schulte and Miller, 2010). One of

the common characteristics of WUI residents is the high value placed on nature, wildlife and privacy. These homeowners may understand the risks posed by wildfires near their homes but choose not to participate in mitigation behaviors because of their environmental value orientation and land use preferences (Bright and Burtz, 2006b; Nelson et al., 2005). Other studies have found that residents might lack accurate information and the knowledge about how to effectively perform certain mitigation behaviors (Nelson et al., 2004; Bright and Burtz, 2006b) or they underestimate how effective their efforts might be so they choose not to try (Lewis and Nickerson, 1989; Kumagai et al., 2004; Winter and Fried, 2000).

A review of risk perception theories by Sjöberg (2000) found that attitudes play a central role in determining risk perception. Using nuclear power as an example, the study determined that people with a positive attitude toward nuclear power were much more likely to perceive fewer risks from its use. Furthermore, “if attitude is a crucial factor in risk perception, and the present results suggest this, then “perception” is largely an expression of specific values” (Sjöberg, 2000, p. 9). According to this review, then, a person’s perception of risk toward a subject could be seen as a reflection of his or her attitude toward the subject.

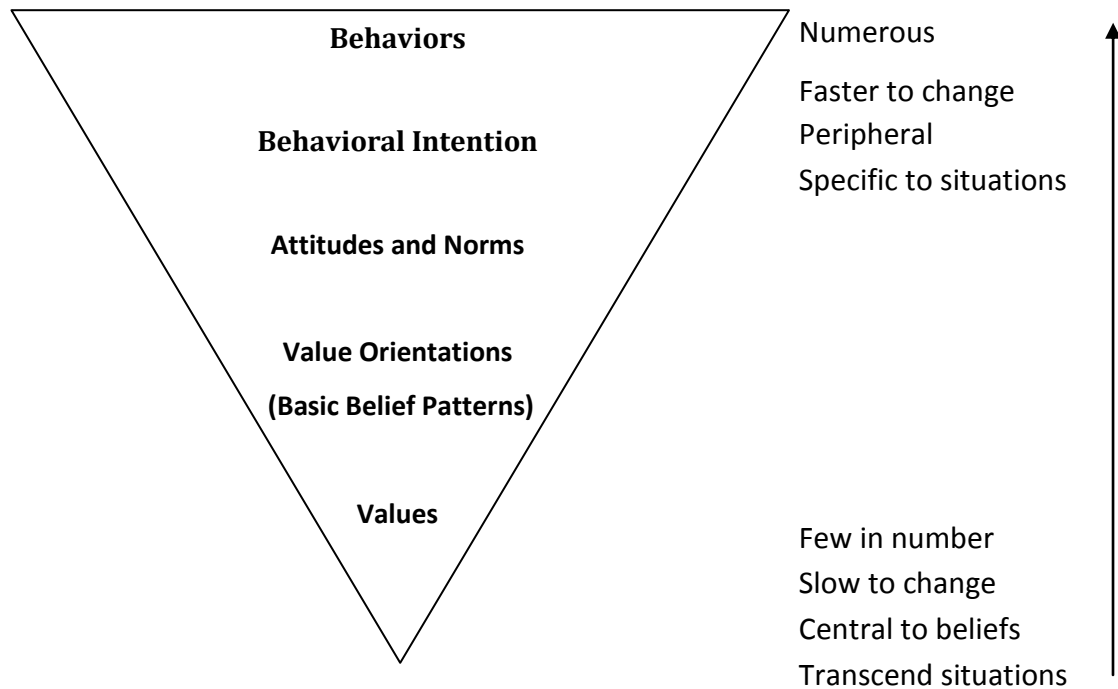
Finally, one of the recurring themes in the risk perception literature is the idea of a risk perception gap (Cohn et al., 2008), which is said to occur when a person demonstrates concern about their level of risk and an understanding of what they should do but chooses not to participate in mitigation behaviors anyway (Cortner and Gale, 1990; Mileti, 2003; Nelson et al., 2005). One explanation for this is that perceptions of risk often do not match

actual risk. People tend to overestimate risks that are small and rare and underestimate risks that are large and more likely to happen (Simmons and Kruse, 2000; Slovic et al., 1979; U.S. EPA Science Advisory Board, 1990). People who have never experienced a devastating wildfire are also likely to underestimate their level of risk (Bradshaw, 1987). In contrast, some studies have found that the most significant determinant for a person's risk perception and mitigation behavior is previous exposure to a wildfire (Tierney et al., 2001) although conflicting studies have shown that some people believe that because a wildfire has recently occurred, it is unlikely that one will happen again (Cohn et al., 2008; McCaffrey 2004).

### **Cognitive Hierarchy**

Research on human behavior has attempted to prove that actions are ultimately a product of a person's fundamental values. Studies on this topic have demonstrated that a person's views are organized into a connected series of events consisting of values, beliefs, attitudes and norms, intentions, and behavior (Ball-Rokeach et al., 1984; Homer and Kahle, 1988). Each of these elements builds on one another with core values forming the basis of a structure that is typically depicted as an inverted pyramid (Figure 2). This structure is known as the cognitive hierarchy (Fulton et al., 1996; Vaske and Donnelly, 1999).

The cognitive hierarchy suggests that behavior is ultimately connected to the values that people hold. There may be other factors related to a particular behavior that directly affect that behavior, but the underlying values will typically form the basis for a person's behaviors (Rokeach, 1973; Vaske et al. 1999; Bright and Burtz, 2006a).



**Figure 2.** The Cognitive Hierarchy. *Source:* Vaske and Donnelly (1999).

Given that values are abstract concepts, value orientations are included as the second step in the pyramid to provide a link between values and behaviors (Fulton et al., 1996; Vaske et al., 2001). The next step in the pyramid includes both attitudes and norms which are predicted to be directly influenced by value orientations (Homer and Kahle, 1988; Vaske and Donnelly, 1999). Finally, there are behavioral intentions and behaviors at the top of the pyramid that tend to be closely related to each other (Fishbein and Manfredo, 1992; Vaske and Donnelly, 1999).

### **Fundamental Values**

At the base of the cognitive hierarchy are fundamental values. These values are central to social cognition, transcend situations and issues and are the fewest in number. They are enduring values that a specific mode of conduct or outcome is preferable to any

alternative (Rokeach, 1973). Whittaker et al. provides an example of the nature of values by explaining that “a person who holds “honesty” as a value would be expected to be honest when completing IRS tax forms, conducting business deals, or interacting with friends” (2006, p. 517). For this person, honesty would always be a value for them and it would be something they would consider in every situation regardless of the circumstances.

Values have also been defined as things that are meant to help facilitate adaptation to our environment (Kahle, 1983). As we gather information from our environments, we use our values as prototypes around which we manufacture our attitudes and behaviors. Given that they are abstract concepts, they can be adapted to fit any situation and provide a cognitive foundation that creates attitudes and beliefs that can be focused on that particular situation (Homer and Kahle, 1988). In this way, values have been shown to have only an indirect influence on behavior because they directly impact our attitudes and beliefs which in turn influence our behavior (Fulton et al., 1996). Homer and Kahle (1988) referred to this specific sequence as the value → attitude → behavior hierarchy. Another reason for believing that values have only an indirect impact on behavior is that they are so few in number. Rokeach (1973) identified only 36 separate values and other studies (Schwartz, 1992; Kahle and Timmer, 1983) identified even fewer. With so few values being shared by many people within a culture, the variability in behavior is more likely to be directly explained by attitudes and norms (Fulton et al., 1996).

### **Value Orientations**

Given that fundamental values are abstract and few in number, value orientations are included in the hierarchy to provide a link between values and attitudes (Fulton et al.,

1996; Vaske and Donnelly, 1999). Value orientations are patterns of basic beliefs that serve to strengthen fundamental values and give them individual meaning. It is these patterns of beliefs that form the connection between our attitudes and values in addition to producing individual differences that ultimately will distinguish us from others who hold the same values (Fulton et al., 1996). For example, “while values measure the extent to which people identify with abstract concepts like altruism or honesty, value orientations explore patterns of beliefs about broad classes of objects (e.g., wildlife, forests), which are thought to link back to underlying values-level cognitions” (Whittaker et al., 2006, p. 517). As a result, two people who have the same fundamental values can still experience different attitudes about a given subject because they have formed different value orientations.

Value orientations can be measured in regards to natural resources in a number of ways. One common method is to use a continuum that measures agreement or disagreement with statements about a particular issue. Research on wildlife issues may use a protection-use continuum that can determine value orientations according to a person’s tendency to want to protect a natural resource versus wanting to use a natural resource (Whittaker et al., 2006). A similar method uses a biocentric-anthropocentric continuum that is useful for determining general environmental value orientation (Shindler et al., 1993; Steel et al., 1994; Vaske and Donnelly, 1999). On this scale, an anthropocentric value orientation would represent a human-centered view of the world where the value of natural resources is measured by its usefulness to humans and not because of any inherent worth. In contrast, the biocentric value orientation recognizes the inherent value of natural resources outside of their usefulness to humans and respects that value even when it comes into direct conflict with human interests (Vaske and Donnelly, 1999).

However, anthropocentric and biocentric value orientations are not always mutually exclusive (Steel et al. 1994). The New Environmental Paradigm Scale that was developed by Van Liere and Dunlap (1980) and has been used extensively in other research places the biocentric viewpoints on one end of a scale the anthropocentric viewpoints on the other. The area at the center of the scale represents a combination of the values. Using the protection-use scale that is similar to the biocentric-anthropocentric scale, Manfredo and Fulton (1997) found that the value orientations of respondents in Belize fell in the center of the scale suggesting that they held both values simultaneously.

### **Attitudes and Norms**

The cognitive hierarchy hypothesizes that value orientations will influence a person's attitudes and norms and previous research has supported this conceptual relationship (Fulton et al., 1996; Vaske and Donnelly, 1999; Vaske et al., 2001). Attitudes are mental states that consistently refer to a specific object in either a positive or negative way (Vaske and Donnelly, 1999). Norms are a judgment about what is appropriate in any given situation (Zinn et al., 1998). Although attitudes and norms have conceptual differences, they are both evaluative variables that use a combination of cognitions to form a single idea. This is because attitudes and norms are more specific than values and as such can have more variability depending on the subject and the situational context (Whittaker et al., 2006). For example, attitudes and norms concerning deer can change considerably depending on the context of the situation. A person may be opposed to a special hunt to reduce deer populations to protect ornamental plantings but in favor of a special hunt in response to an outbreak in Lyme disease that is threatening human populations (Deblinger

et al., 1993). Using specific subjects and situations has also shown to produce better predictions of behavioral intentions. In Colorado, attitudes toward wolf reintroduction were more likely to predict decisions to support or oppose wolf reintroduction than were attitudes toward wolves in general (Bright and Manfredo, 1996).

A study by Vaske et al. (2001) focused specifically on the relationship between value orientation and norms. Their study confirmed the theoretical relationship between value orientations and norms, but they also found that factors not contained in the cognitive hierarchy might also explain part of the relationship. Expanding on the cognitive hierarchy to include demographics in their model, they found that different groups of people were more likely to hold certain value orientations and norms about national forest management although the effects of demographics were generally weak. Other studies have shown that these findings could likely be generalized to a variety of natural resource issues (Fulton et al., 1996; Ingram and Lewandroski, 1999). Knowing who is likely to hold certain value orientations and norms could prove to be an invaluable piece of information for natural resource managers.

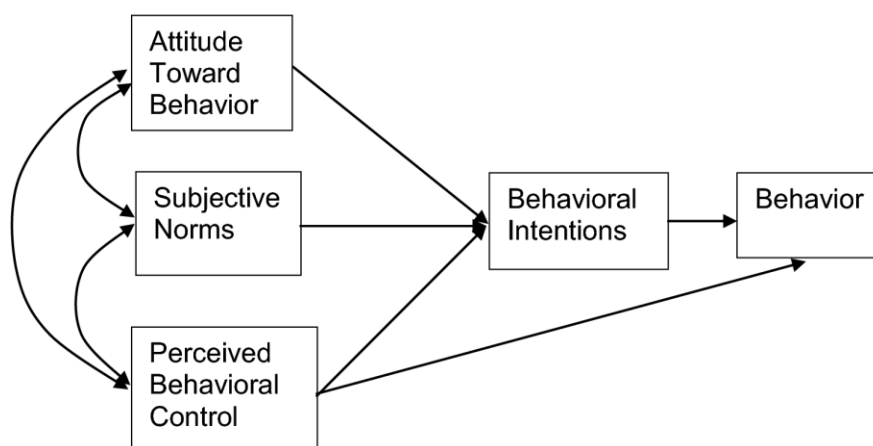
### **Behavioral Intentions and Behaviors**

According to the cognitive hierarchy, a person's attitudes and norms will generate behavioral intentions and will culminate in actual behaviors. Research on the relationship between attitudes and behavior has primarily focused on the theory of reasoned action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). The theory of reasoned action suggests that a person's attitudes and norms can be strong predictors of their behavioral intention. Studies supporting this prediction have shown that once a person becomes



interested in a particular behavior, the determinants of their intention are almost identical to the determinants of the behavior itself (Vaske and Donnelly, 1999).

One limitation of the theory of reasoned action is that it assumes that most behaviors are completely volitional and that there are no external barriers to carrying out certain behaviors (Bright and Burtz, 2006a). Under this assumption, attitudes and norms are the only the things that influence a person's behavioral intention. The theory of planned behavior (Figure 3) posits that a person will also consider their perceived behavioral control in addition to their attitudes and norms. Perceived behavioral control is the amount of control that a person feels they have over potential barriers to carrying out any activity. These barriers can include cost, ability to do the behavior, and knowledge of how to do the activity, although it is the perception of barriers that matters and not whether the barriers actually exist (Ajzen, 1991; Bright and Burtz, 2006a). According to the theory of planned behavior, it is the combination of attitude, norms and perceived behavioral control that affect behavioral intention. "As a general rule, the more favorable the attitude and



**Figure 3.** Theory of Planned Behavior (Ajzen, 1991).

subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior under consideration" (Ajzen, 1991, p. 188). Furthermore, when controlling for behavioral intention, perceived behavioral control can also influence the likelihood of carrying out a behavior. The application of the theory of planned behavior for natural resource issues is recognizing that not all behaviors are entirely volitional. Even people who are eager to carry out activities they are interested in and consider meaningful may be discouraged by perceived barriers (Bright and Burtz, 2006a).

## **Hypotheses**

Based on the conclusions of previous studies and the theoretical assumptions of the cognitive hierarchy, the following hypotheses were developed:

**H1:** Value orientation as determined by the NEP will be a direct predictor of belief in climate change and its impacts.

**H2:** Belief in climate change will not be a sole direct predictor of participation in Firewise behaviors.

**H3:** Belief in climate change coupled with its impacts will be a direct predictor of Firewise behaviors.

**H4:** Risk perception will act as a mediator between belief in climate change and its impacts and participation in Firewise behaviors.

## **Methods**

### **Data Collection**

Data were collected using a mail survey sent to a random sample of 1506 residents within the survey area. The sample survey names and addresses were provided by a commercial research company. The survey was administered between March and May 2011 using a modified version of the Dillman (2007) design method. First, a preliminary postcard was sent to the selected respondents alerting them that a survey would be arriving in the upcoming weeks. Second, the survey was sent along with a cover letter explaining the research and a prepaid return envelope. Finally, a second survey, cover letter and return envelope were sent to those who had yet to respond. Of the initial 1506 surveys that were sent out, 720 completed surveys were returned by respondents and 92 were returned by the post office as bad addresses resulting in a 51% response rate.

### **Study Area**

The study area for the survey was located in Central Oregon in an area covering the entire state from the northern border to the southern border and an area between the crest of the Cascade Range to the west and the edge of the sagebrush steppe to the east. The sample population was drawn from a simple random sample of six Oregon counties, Crook, Deschutes, Jefferson, Klamath, Lake, and Wasco. These counties included the population centers of Bend, Klamath Falls, Redmond and The Dalles. The study area was chosen because of its fire-prone history as well as its diverse ecological and social characteristics.

## Survey Design and Model Variables

The survey was seven pages long and contained three sections. The first section was concerned with respondents' interests in, activities and knowledge of wildfire issues in Central Oregon which included questions about the contributing causes of wildfire and thirteen questions about specific Firewise behaviors. The thirteen questions on Firewise behaviors were taken from a similar survey by Kyle et al. (2010) that looked at the relationship between home and community attachment and Firewise behaviors. They are divided into four broader categories that attempt to group similar behaviors into their own categories. Items "a" and "b" were labeled as general planning activities that residents would do in preparation of a wildfire; items "c" through "f" were activities that residents would participate in with other members of the community; items "g" through "j" were specific activities that residents would perform to protect their entire property; and items "k" through "m" were the activities that were meant to protect the residents' homes. These 13 items were put into a single index that represented overall participation in Firewise behaviors. The first section also contained a five part question concerning perception of risk. These items were also put into an index that was used as the measure of risk perception. This variable was used in the path analysis models after a review of the literature indicated its importance in the wildfire mitigation decision making process.

The second section concerned respondent's attitudes towards the environment and contained a modified version of the shortened six-item New Ecological Paradigm (NEP) Scale that was created yet never published by Dunlap in 1982 (Dunlap et al., 2000) but has been used by other researchers in the past (Pierce et al., 1989; Pierce et al., 1992). Similar

to the original six-item scale, the modified version contained two questions from each of the three facets of the original scale: balance of nature, limits to growth, and anti-anthropocentrism. Three of the questions were worded biocentrically and three were worded anthropocentrically to maintain the balance of the original scale. These six items were put into an index that was used to measure value orientations. There were also two questions about climate change that were taken from a nationwide survey administered by the Pew Research Center for the People and the Press (2009).

These two climate change questions along with a question from section 1 were combined to create a new variable for the model. The three questions concerned the belief in climate change (yes or no), the cause of climate change (natural or human), and the belief that climate change contributes to wildfire. Using these three questions, the new variable was created on a scale of 1-4 with 1 being a person who doesn't believe in climate change and 4 being a person who believes in climate change, believes it is caused by human activity, and believes it contributes to wildfires. This variable will be referred to as specific climate change beliefs. There are three reasons for creating this variable. First, the two climate change questions were generally grouped together throughout this study based on the assumption that believers in climate change are not a homogeneous group, so there should be a distinction between them. The results of the survey support this assumption as 52% of those who believe in climate change believe it is caused by human activities compared to 30% who believe it is caused by natural patterns. Second, if a person believes in climate change but does not believe that it contributes to wildfires, there would be no incentive for them to behave in a certain way based on that belief, at least not in regards to fire mitigation. This assumption is discussed further in the results. Finally, while it is

possible to infer that anyone who believes that climate change contributes to wildfire must also believe that climate change is happening, over 10% of the respondents who listed climate change as a contributing factor to wildfires said they either did not believe in climate change or they did not know. This fact precluded the use of climate change as a contributing cause of wildfire as the primary variable in the model and led to the creation of a variable that included all three responses.

The third and final section focused on demographics and questions about respondent's home and community. These included questions about gender, age, employment, residence, and level of education. These variables were not included in the analysis.

### **Data Analysis Methods**

The survey results were put into a database and analyzed using the statistical package SPSS. Three path analysis models were created to explore the relationships between environmental value orientation, belief in climate change and Firewise behaviors. Path analysis is a technique similar to a multiple regression analysis only it uses two or more dependent variables rather than one dependent variable. It is used for "estimating the magnitude of the linkages between variables and using these estimates to provide information about the underlying causal process" (Vaske, 2008, p. 575). The purpose of using this model is to determine the strength of the relationship between the independent and dependent variables and determine how much of that relationship is influenced by a mediating variable. It is a useful form of analysis when using the cognitive hierarchy because they both rely on the theoretical assumption that concepts can be traced

backwards using causal reasoning. Consequently, only the variables specific to a particular relationship need to be included in the model.

In addition to the path analysis, a reliability analysis was done on the risk perception and NEP scales as well as the Firewise index. Reliability analysis is done to examine the internal consistency of a set of items designed to measure a given concept. This study used Cronbach's alpha which determines the extent to which items on a scale coordinate with each other. It can also be interpreted as a test of the scales reliability. The acceptable size for Cronbach's alpha can vary, but an alpha of approximately .70 or higher is generally considered to be a good scale (Vaske, 2008).

## **Results**

### **Sample Characteristics**

As shown in Table 1, the sample was comprised of generally well educated homeowners with 37% of respondents holding a college or professional degree and 85% owning their own home. The sample population was slightly older ( $M=54$  years) when compared to the average age of the six counties ( $M=49$ ) that were surveyed as reported by the U.S. Census (2009), and consequently, contained a large segment of retired people (34.8%). The sample was 46% female and 54% male.

**Table 1.** Sample characteristics

<b>Indicator</b>	<b>%</b>	<b>M</b>	<b>SD</b>
Age (years) [N=710]		54.2	15.4
Gender [N=712]			
Male	54		
Female	46		
Education [N=716]			
Less than high school	1		
High school	21		
Vocational school	5		
Some college	36		
College graduate	31		
Graduate school	6		
Employment [N=702]			
Full time	44		
Part time	12		
Work from home	3		
Unemployed	2		
Retired	35		
Student	1		
Other	3		
Years lived in Central Oregon [N=717]		24.2	18.7
Years lived at current residence [N=717]		12.7	11.6
Home ownership [N=709]			
Own	85		
Rent	15		
Proximity to a wildland area [N=706]			
Live within a wildland area	8		
Adjacent to a wildland area	15		
100-300 yards	6		
300 yards to 1 mile	14		
1-3 miles	29		
More than 3 miles	28		

### Reliability Analysis

A reliability analysis was conducted using Cronbach's alpha reliability coefficients to test the internal consistency of the NEP and risk perception scales. Table 2 shows that the Cronbach alpha for 6-item NEP scale was .79. Each of the items had an inter-item correlation coefficient above .40 and deleting any of the variables would have lowered the overall alpha. The 5-item risk perception scale had a Cronbach alpha of .81 and each item



had an inter-item correlation coefficient of .40 or higher. However, the results showed that the Cronbach alpha would have increased had the item regarding perceived risk in Central Oregon been eliminated from the scale. According to Vaske (2008), removing an item from a scale should be done if the resulting alpha is substantially higher. He goes on to say, “The decision to include or exclude a given variable from a scale should be based on theoretical reasoning, not simply the size of the resulting reliability coefficient” (2008, p. 524). Based on these two factors, the item was retained because the alpha would have increased by just .01 and it made theoretical sense to maintain the original intent of the scale which was to weigh the overall perception of risk against the proximity of wildfire.

**Table 2.** Reliability analysis of NEP and risk perception scales.

Indicator	Mean	Corrected Item-Total Correlation	Cronbach's Alpha if Deleted	Cronbach's Alpha
New Ecological Paradigm (NEP) Scale <sup>ab</sup> [N=704]				.79
The balance of nature is very delicate and easily upset by human activities	3.8	.61	.75	
Humans have the right to modify the natural environment to suit their needs <sup>b</sup>	3.3	.45	.78	
We are approaching the limit of people the earth can support	3.4	.49	.78	
The so-called “ecological crisis” facing humankind has been greatly exaggerated <sup>b</sup>	3.2	.57	.76	
Plants and animals have as much right as humans to exist	3.8	.57	.76	
Humans were meant to rule over the rest of nature <sup>b</sup>	3.6	.59	.75	
Risk Perception Scale <sup>c</sup> [N=686]				.81
Wildfire in Central Oregon	3.2	.40	.82	
Wildfire in your county	3.2	.47	.81	
Wildfire in your community	2.4	.73	.73	
Wildfire in your neighborhood	2.1	.73	.72	
Wildfire threat to your residence or property	2.0	.65	.75	

<sup>a</sup> Items were coded on a 5-point scale ranging from 1, strongly disagree, to 5, strongly agree.

<sup>b</sup> The antropocentrically worded questions were reverse coded. The combined 6-item NEP scale ranges from 6, anthropocentric, to 30, biocentric.

<sup>c</sup> Respondents were asked how much risk they felt about a future wildfire. Items were coded on a 4-point scale ranging from 1, no risk, to 4, high risk.

An index was also created using the 13 Firewise behaviors listed in the survey. The percentages of people that reportedly participated in each behavior are shown in Table 3.

**Table 3.** Percentage of respondents participating in each Firewise behavior

Firewise Behaviors	N	% Part.
General Planning:		
Prepare an evacuation plan in case of wildfire	696	36
Plan recreation activities that involve fire	705	66
Community activities:		
Attend community-based meetings related to wildfire	705	21
Obtain information from a land management, community group or firefighting agency on how to prepare for wildfire	703	43
Volunteer within the community to help clear and remove combustible material	702	25
Help organize community education programs related to wildfire	703	9
Property protection activities:		
Plant fire-resistant plants	703	47
Plant trees and shrubs at least 15 feet apart	701	48
Prune the branches of all trees within 85 feet of your house to a height of 10 feet above the ground	704	49
Reduce the density of trees within 100 feet of your home	701	41
Home protection activities:		
Clean roof surfaces/gutters and surrounding vegetation to avoid accumulation of needles, leaves and dead plants	707	80
Stack firewood/lumber at least 30 feet from house	696	52
Use nonflammable building materials such as tile, slate, stone, etc.	698	50

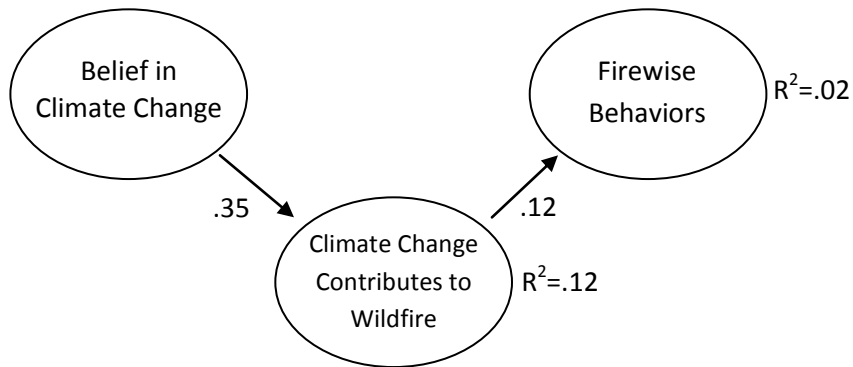
Respondents were asked, yes or no, if they had participated in any of these activities.

## Path Analysis

The first path analysis was conducted to confirm the first hypothesis that belief in climate change would not be a direct predictor of Firewise behaviors. This hypothesis was based on the assumption that believing in climate change would not motivate a person to participate in Firewise behaviors if they did not also believe that climate change contributed to wildfires. Using this assumption, the predicted outcome of the first path analysis was that the belief that climate change contributes to wildfires would fully mediate

the relationship between belief in climate change and Firewise behaviors. The first step in this path analysis was to determine the effect of climate change belief on reported Firewise behaviors using the Firewise index. When regressed on the index, climate change belief had a significant effect on Firewise behaviors,  $\beta=.11$ ,  $p < .001$ . This finding supports the first step in establishing mediation using path analysis which requires the independent variables to have a direct effect on the dependent variables.

The second step in establishing mediation is to show that the independent variable also has a direct effect on the mediator. In this case, belief in climate change had a direct effect on the belief that climate change contributed to wildfires,  $\beta=.35$ ,  $p < .001$ . The final step in establishing mediation is to regress both the independent and mediator variables on the criterion or dependent variable. If the effect of the independent variable on the dependent variable is no longer significant, the relationship has been fully mediated. As seen in Figure 4, the relationship between climate change beliefs and Firewise behavior was no longer significant when controlling for the belief that climate change contributes to wildfires,  $\beta=.08$ ,  $p = .14$ . The effect of believing that climate change contributes to wildfire on Firewise behaviors, however, was significant,  $\beta=.12$ ,  $p = .02$ , but the adjusted  $R^2$  of .02 means that only 2% of the variance in the model is explained by these variables. These results confirm hypothesis 2 as well as validate the use of the specific climate change belief variable in the following path analyses.

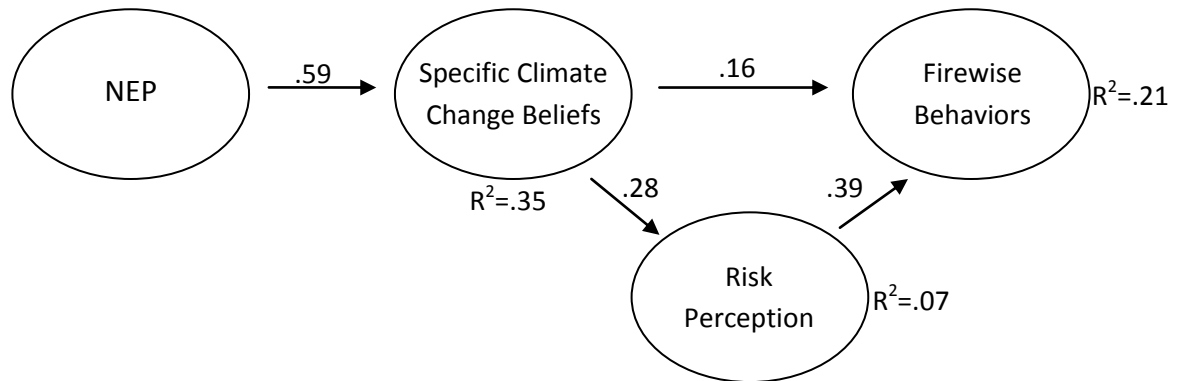


**Figure 4.** Path analysis model of the influence of climate change belief on Firewise behavior and the mediated influence of believing climate change contributes to wildfire. All significant paths are show ( $p \leq .02$ ).

Having determined the reliability of the NEP and risk perception scales and the Firewise index, a path analysis was conducted to look at two separate relationships. The first was the relationship between environmental value orientation (NEP scale) and specific climate change beliefs, and the second was the relationship between climate change beliefs, risk perception, and Firewise behaviors. The path analysis was done in three steps. The first step looked at two direct relationships, one between value orientation and specific climate change beliefs, and the other between specific climate change beliefs and Firewise behaviors. As seen in Figure 5, value orientations influenced specific climate change beliefs,  $\beta = .59$ ,  $p < .001$ , and explained 35 % of the variance in the model. This finding supports hypothesis 1. Analysis also showed that specific climate change beliefs influence participation in Firewise behaviors,  $\beta = .26$ ,  $p < .001$ , and explained 6% of the variance in the model. This finding supports hypothesis 3.

The second step looked at the direct effect of specific climate change beliefs on risk perception. In order to establish mediation, the independent variable must also directly

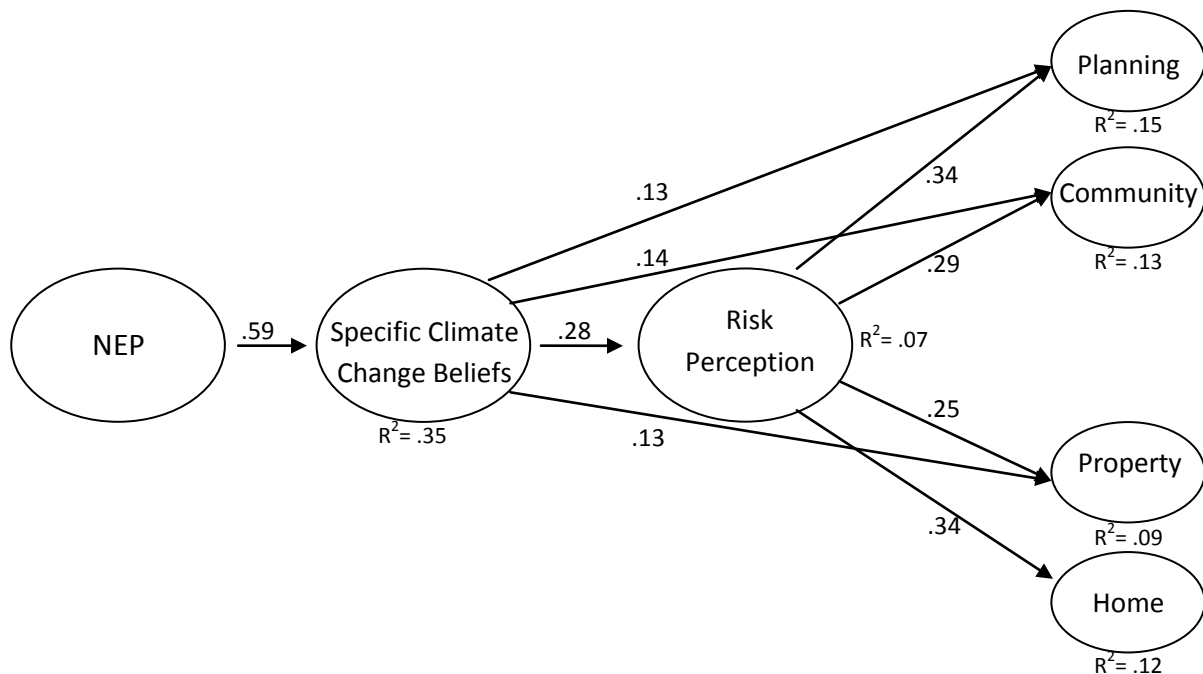
effect the mediator variable. This requirement was fulfilled as specific climate change beliefs had a direct influence on risk perception,  $\beta=.28$ ,  $p < .001$ ,  $R^2=.07$ .



**Figure 5.** Path analysis model of the influences of value orientations on beliefs and the mediated influence of beliefs on behaviors. All values are significant at  $p < .001$ .

The final step in establishing mediation is running a regression on the dependent variable (Firewise behaviors) using both the independent variable (specific climate change beliefs) and the mediator (risk perception). This regression showed that risk perception had a direct effect on Firewise behaviors,  $\beta=.39$ ,  $p < .001$ . It also showed that the effect of specific climate change beliefs on Firewise behaviors had been reduced,  $\beta=.16$ ,  $p < .001$ . Although it had been reduced, the mediator had not completely eliminated the effect of specific climate change beliefs on Firewise behaviors meaning risk perception only partially mediated the relationship. Together, the two variables accounted for 21% of the variance in the model. The final step in the path analysis is determining whether the mediation of the indirect effect of specific climate change beliefs on Firewise behaviors by risk perception was statistically significant using a Sobel test. The z-score produced by the Sobel test was significant, 5.09,  $p < .001$ , indicating that the effect of specific climate change behaviors on Firewise behavior was partially mediated by risk perception.

A third path analysis was done using the same independent and mediator variables but used the four categories of Firewise behaviors as the dependent variables. The purpose of this model was to determine if there was a significant difference between the mediating effect of risk perception on the individual components of Firewise behavior compared to the Firewise index as a whole. The results of this analysis shown in Figure 6 were consistent with the first model in all but one of the behavioral areas. Without the mediating effect of risk perception in the model, specific climate change beliefs had a significant effect on each of the four components. However, when risk perception was included, the effect of specific climate change beliefs on home protection activities was no longer significant. The influence of risk perception was strongest on the planning and home protection behaviors and weakest on property protection behaviors. This finding is a reminder that even though Firewise behaviors are often grouped together for research purposes, there are practical



**Figure 6.** Path analysis model of the influences of value orientations on beliefs and the mediated influence of beliefs on specific behaviors. All values are significant at  $p < .001$

differences between them that need to be considered when making policy recommendations.

## **Discussion**

The path analysis of specific climate change beliefs on Firewise behaviors was able to determine that beliefs can influence behavior although it is only when there is a specific connection between the belief and the behavior that the influence will be felt. The general belief that climate change was happening was not a significant predictor of Firewise behavior. Those people who recognized that climate change was also contributing to wildfires were more likely to engage in Firewise behaviors than those who only believed in climate change. The analysis also revealed the mediating effects that risk perception had on the relationship between beliefs and behaviors. The influence of specific climate change beliefs was reduced when risk perception was included in the model. In addition, a strong relationship between environmental value orientation and specific climate change beliefs was identified which supports the conceptual relationship between values and beliefs prescribed by the cognitive hierarchy.

Although this research was conducted using the cognitive hierarchy as a framework, the methods were not entirely consistent with previous studies. Past research has focused on the entire cognitive hierarchy (Vaske and Donnelly, 1999; Whittaker, 2006) or specific relationships between connected components of the hierarchy (Vaske et al., 2001). This study, however, explored the relationship between value orientations, beliefs, and behaviors, effectively bypassing the role of norms, attitudes and behavioral intentions. Despite this conceptual difference, the results of the study were consistent with the

contentions of the cognitive hierarchy. One hypothesis put forth by the cognitive hierarchy says that more specific concepts will be better at predicting behaviors (Bright and Manfred, 1996). This study showed that general beliefs about climate change did not have a significant effect on behavior while the specific belief that climate change contributed to wildfires did increase the likelihood of participating in Firewise behaviors. It also found that a connection could be traced from behaviors back to value orientations, which is the fundamental argument behind the cognitive hierarchy.

One of the implications of this study is that people are more likely to participate in Firewise behaviors if they understand the connection between climate change and wildfires. Of those surveyed, only 29% believed climate change was one of the factors that contributed to wildfires, and of the people who believed in climate change, 60% believed that it contributed to wildfires. With the effects of climate change on forests already being observed and greater impacts being predicted in the near future, there would appear to be a communication gap between scientists and the public. If the goal for natural resource managers is to get more people to engage in Firewise behaviors, more effectively explaining the relationship between climate change and forest fires might be one way to accomplish that. The strong correlation between specific climate change beliefs and risk perception suggests that an increased understanding of how climate change might personally affect them through wildfires might lead to an increased perception of risk. Of course, this would only work on people who already believe in climate change. People who do not believe in climate change are unlikely to be motivated by that relationship, so managers would not want to target any connection to climate change with this group of people.



In addition to avoiding the effect of climate change on wildfires among certain groups of people, managers may also want to avoid the issue of climate change entirely. The cognitive hierarchy suggests that people will ultimately make decisions based on their underlying values. Values are formed early in a person's life and typically will not change throughout their lifetime. They are often tied to societal values that tend to change generationally or following a catastrophic event (Manfredo et al., 2003). Given the strong correlation between values and belief in climate change, it is unlikely that people will change their minds regarding climate change unless their values are changed first. Wildland managers might have better success trying to encourage Firewise behaviors in ways that are consistent with existing values and beliefs.

One of the concepts that wildland managers might target is risk perception. The path analysis found that risk perception was a key factor in influencing Firewise behaviors, so focusing on the potential for larger and more dangerous fires could be a possibility when a person's values and beliefs are unknown. The effects of wildfire may offer more motivation than the cause of wildfire. Pointing out past examples of large wildfires might increase a person's perception of risk without conflicting with their underlying values. They might also try to reduce the risk perception gap that has been discussed in previous literature. This would most likely be accomplished through education programs that teach residents about actual levels of risk and attempt to clarify some of the misconceptions about risk levels that currently exist. Resource managers could also focus on some of the other determinants of risk not discussed here in order to appeal to a larger audience.

On a larger scale, resource managers will need to consider the implications of having to fight wildfires that are larger and occur more frequently. The costs associated with wildfire suppression have increased substantially in recent years and are predicted to climb even higher as a result of climate change (Gude et al., 2009). Homeowner participation in mitigation behaviors will become essential if protection efforts have any chance of saving lives and property in the wildland-urban interface. Relying solely on the government as a means of protection will no longer be a possibility. Furthermore, communities will need to regulate the amount of expansion allowed into wildland areas using urban growth boundaries. Many remote wildland areas will need to be allowed to burn without management to concentrate efforts in populated areas. Some states already have legislation in place that encourage or require counties and communities to prepare plans that will reduce the threat of wildfire, but if fire prevention and protection efforts are going to be successful, they will need to be enforced across all levels of government with full cooperation among the stakeholders.

## **Conclusion**

Past research concerning the relationships between climate change beliefs and behaviors related to wildfire has been limited. The purpose of this article was to examine one specific relationship within this emerging field. There are a number of other issues related to climate change and wildfire mitigation that need to be explored before any definitive conclusions can be drawn. This article was formulated according to the principles of the cognitive hierarchy and was based on the conceptual logic that believing in a connection between climate change and wildfires would make a person more likely to engage in Firewise behaviors. Consistent with the cognitive hierarchy, this study also

hypothesized that an attitude or norm would partially mediate that connection. After a review of the relevant literature, it was determined that risk perception would serve as a likely mediator. Using survey data from six counties in Central Oregon, this study found that there was a positive relationship between the belief that climate change contributes to wildfires and the decision to participate in Firewise behavior. A path analysis of the relationship also confirmed the hypothesis that risk perception would act as a partial mediator.

### **Limitations**

One possible limitation of the survey was that the sample population included a relatively large percentage of people who did not live near a wildland area. With the sample being drawn at the county level, some of the study area did not contain large areas of wildland. Of the population sampled, 23% reportedly lived within or adjacent to a wildland area, 20% lived within 1 mile, and 57% lived more than 1 mile from a wildland area. Although these estimates were self-reported and not necessarily accurate, a population consisting of a larger number of residents that lived near wildland areas may have provided more insight into the issue.

### **Future Research**

A recommendation for future research on this topic is to further explore several of the concepts described by the cognitive hierarchy, particularly the influence that attitudes and norms have on behavior. These concepts were not covered in the survey and were replaced with risk perception in the analysis, but a study conducted with the cognitive hierarchy in mind should include more in depth questions about attitudes toward wildfires

and wildfire mitigation strategies. Future research might also look at behavioral intention in addition to reported behaviors. The theory of planned behavior posits that people may have the intention to participate in a behavior yet choose not to. The purpose of this survey was to determine which people were currently participating in Firewise behaviors and for what reasons. It may also be useful to understand some of the reasons why a person chooses not to engage in Firewise behaviors. There may be perceived barriers that prevent people from participating that could be addressed by natural resource managers.

The limited focus of the project meant that a relatively small portion of the total survey data that was collected was actually utilized. There are a number of other variables that could have been included in the analysis but were outside of the scope of this research. Future research should include more of these variables in order to provide a more comprehensive understanding of the issue.

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## **Appendix: Survey Questions**

# **Public Attitudes Toward Wildfire in Central Oregon**



*Please return surveys to:*

*Public Attitudes Toward Wildfire in Central Oregon*

**School of Public Policy**

**311 Gilkey Hall**

**Oregon State University**

**Corvallis, Oregon 97331-6206**

**541-737-2811**

ID # \_\_\_\_\_

[for mailing purposes only]

## SECTION 1

In this first section of the survey we would like to ask you some general questions about your interests in, activities relating to and knowledge of wildfire issues in Central Oregon. Please circle the number that most closely represents your view.

**Q-1** In general, how well informed would you consider yourself to be concerning wildfire issues in Central Oregon?

1. Not informed
2. Somewhat informed
3. Informed
4. Very well informed

**Q-2** How familiar are you with your county's Community Wildfire Protection Plan (CWPP)?

1. Not informed
2. Somewhat informed
3. Informed
4. Very well informed

**Q-3** Do you feel wildfire management is a problem in Central Oregon?

1. Yes, it is a problem (go to Q-4)
2. No, not a problem (go to Q-5)
3. Don't know (go to Q-5)

**Q-4**

What factors do you feel contribute to wildfire in Central Oregon? (Circle all that apply.)

- |  |   |
|--|---|
| 1. Climate change                                    | 4. Human carelessness (e.g., fireworks, campfires)                          |
| 2. Lack of proper forest management (e.g., thinning) | 5. Increasing development in forested areas (e.g., new home building, etc.) |
| 3. Diseased and dead trees                           | 6. Other_____   |

- Q-5** We are interested in your perceptions about previous exposure to and future risk of wildfires. On the left side of the page, please circle the number that indicates the level of risk you perceive for future fires in Central Oregon. On the right hand side, circle the number that indicates your exposure to wildfires over the last five years (since 2006).

***How much risk do you feel about a future wildfire?***

1. No risk
2. Low risk
3. Moderate risk
4. High risk

***Please indicate level of exposure—if any—with each event.***

1. No exposure
2. 1 to 2 days
3. 3 to 5 days
4. 6 days and more

1	2	3	4	<b>a.</b>	Wildfire in Central Oregon forests.	1	2	3	4
1	2	3	4	<b>b.</b>	Wildfire in your county.	1	2	3	4
1	2	3	4	<b>c.</b>	Wildfire in your community.	1	2	3	4
1	2	3	4	<b>d.</b>	Wildfire in your neighborhood.	1	2	3	4
1	2	3	4	<b>e.</b>	Wildfire threat to your residence or property.	1	2	3	4

- Q-6** Were you ever evacuated as a result of a wildfire? If yes, how many times?

1. Yes                      2. No                      # of times \_\_\_\_\_

- Q-7** For reducing the threat of wildfire, how much confidence do you have in natural resource managers (Forest Service, Bureau of Land Management) in your area:

	None	Limited	Moderate	Full	Not Sure
<b>a.</b> ...to responsibly and effectively use prescribed fire?	1	2	3	4	5
<b>b.</b> ...to safely allow some naturally ignited fires to burn?	1	2	3	4	5
<b>c.</b> ...to responsibly use thinning to reduce forest fuels?	1	2	3	4	5



					Not relevant	No interest	Too costly	Takes too much time	One person makes little difference
j.	Reduce the density of trees within 100 feet of your home.	Yes	No	→	1	2	3	4	5

**Home Protection Activities:**

k.	Clean roof surfaces/gutters and surrounding vegetation to avoid accumulation of needles, leaves and dead plants.	Yes	No	→	1	2	3	4	5
l.	Stack firewood/lumber at least 30 feet from house.	Yes	No	→	1	2	3	4	5
m.	Use nonflammable building materials such as tile, slate, stone, etc.	Yes	No	→	1	2	3	4	5

**Q-9** If you answered yes for any of the activities in Q-8, how important were the following factors in your decision to participate?

		Not important	Somewhat important	Moderately important	Very important
a.	Fire risk	1	2	3	4
b.	Recent wildfire activity	1	2	3	4
c.	Neighbors property condition	1	2	3	4
d.	Property owner association	1	2	3	4
e.	County or state requirements	1	2	3	4
f.	Insurance company requirements	1	2	3	4
g.	Like the aesthetics better	1	2	3	4

## SECTION 2

This section of the survey concerns your attitudes toward the environment and politics. Please circle the number that most closely represents your view.

**Q-10** Listed below are statements about the relationship between humans and the environment. For each, please indicate your level of agreement.

	Strongly disagree	Mildly disagree	Neutral	Mildly agree	Strongly agree
<b>a.</b> The balance of nature is very delicate and easily upset by human activities.	1	2	3	4	5
<b>b.</b> Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5
<b>c.</b> We are approaching the limit of people the earth can support.	1	2	3	4	5
<b>d.</b> The so-called "ecological crisis" facing humankind has been greatly exaggerated.	1	2	3	4	5
<b>e.</b> Plants and animals have as much right as humans to exist.	1	2	3	4	5
<b>f.</b> Humans were meant to rule over the rest of nature	1	2	3	4	5

**Q-11** From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past few decades, or not?

1. Yes (go to Q-12)
2. No (go to Q-13)
3. Don't know (go to Q-13)

**Q-12** Do you believe that the earth is getting warmer...?

1. Mostly because of human activity such as burning fossil fuels.
2. Mostly because of natural patterns in the earth's environment.
3. Don't know

### SECTION 3

We now have a few concluding questions to check to see if our survey is representative of all types of people. We also have included a couple of questions concerning politics. Please remember that all answers are completely confidential.

**Q-13** What is your current age in years? \_\_\_\_\_

**Q-14** Please indicate your Gender:            1. Female      2. Male

**Q-15** What level of education have you completed?

- |                                 |                     |
|---------------------------------|---------------------|
| 1. Grade school                 | 5. Some college     |
| 2. Middle or junior high school | 6. College graduate |
| 3. High school                  | 7. Graduate school  |
| 4. Vocational school            | 8. Other _____      |

**Q-16** Which of the following best describes your current work situation?

- |                                  |                |
|----------------------------------|----------------|
| 1. Employed full time            | 5. Retired     |
| 2. Employed part time            | 6. Student     |
| 3. Not employed outside the home | 7. Other _____ |
| 4. Unemployed                    |                |

**Now we'd like to ask about your neighborhood and residence.**

**Q-17** How long have you lived in Central Oregon?            Years \_\_\_\_\_

**Q-18** How long have you lived in your current residence?    Years \_\_\_\_\_



**Q-19** Do you own or rent your residence?

1. Own
2. Rent

**Q-20** Is this your permanent residence or seasonal/vacation home?

1. Seasonal
2. Permanent

**Q-21** Regarding the property adjacent to your house, is it developed or undeveloped?

1. Developed
2. Undeveloped

**Q-22** Are there rules about landscaping or building materials in your area to help protect against fires?

1. Yes
2. No

**Q-23** In which type of residence do you live?

1. Mobile home or trailer
2. One family house – detached (less than 1 acre lot)
3. One family house (1 to 5 acres)
4. One family house (more than 5 acres)
5. A building with apartments
6. A one family house attached to one or more houses

**Q-24** How close is your residence to a wildland area (either forest or rangeland)?

1. Live within a wildland area
2. Adjacent to a wildland area
3. Between 100 and 300 yards
4. More than 300 yards but less than a mile
5. Between 1 and 3 miles
6. More than 3 miles

**Q-25** Finally, concerning your residence in Central Oregon, would you say you have an emotional attachment to the place?

1. Yes
2. No
3. Not sure

Those are all the questions we have. If you have any additional comments, please include those below or on a separate piece of paper. Thank you for your time.