Forest as Hazard, Forest as Victim:

The Influence of Community Perceptions of Nature and Disaster on Forest Fire Mitigation Strategies in Kelowna, British Columbia

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Abstract

Large-scale disaster events in recent years have accelerated an interest within hazards research in the social contributions to disaster vulnerability in North America. This study examines the municipality of Kelowna, which borders on forested lands within the Southern Interior region of British Columbia, and which was significantly impacted by wildfire in August 2003. The goals of this study are to provide a deeper understanding of the complex ways in which Kelowna residents, in the years since the 2003 fire, have chosen to place meaning on forest health and community safety within their own lives; and to explore the ways in which current community policies for ecological sustainability and disaster mitigation can be enriched by this breadth of perspectives.

Each of the three nature perspectives that were explored among Kelowna area residents ('forest as hazard', 'forest as aesthetically valuable' and 'forest as inherently valuable') provided significant insights into their motivations to support or reject efforts to modify area forests. An application of the awareness of these views to the development of participatory disaster mitigation strategies for the community requires that forestry and fire mitigation agencies determine multiple courses of action among the varied and valid range of residents' nature perspectives. This type of approach would educate residents about the risks and benefits associated with particular mitigation strategies, and would incorporate the opinions and knowledges about nature that are held by residents outside the range of so-called 'expert' discourses.

Acknowledgements

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Special thanks goes to the residents of Kelowna, who, through their knowledge and enthusiasm, helped me to more fully understand the great value of the community and its wonderful forested landscapes. I'd also like to thank the forestry and government officials who took time out of their busy schedules to speak with me at length about Kelowna residents' views.

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Table of Contents

Abstract ii
Acknowledgements iii
Table of Contents iv
List of Illustrations viii
List of Appendices x

Introduction **1**

Chapter 1: Context **7**

1.1 The City of Kelowna, British Columbia and the Okanagan Mountain Park Fire 8

1.1.1 City of Kelowna, British Columbia 8
1.1.2 The Okanagan Mountain Park Fire 12

1.2 Physical Characteristics of Forests and Forest Fires within and Surrounding Kelowna 13

1.3 The Evolving Science, Politics and Policies of Forest and Forest Fire Management in North America 19

1.3.1 A Recent History of Forest Fire Management in North America 19
1.3.2 Specific Mitigation Strategies 24
1.3.3 Current Forest Fire Management Policy at the National Level 27
1.3.4 Forest Fire Recommendations for British Columbia since the 2003 Fire 30

1.4 Current Approaches to Disaster Mitigation among Forest and Fire Management Agencies in and around Kelowna 34

1.4.1 British Columbia Ministry of Forests and Range 34
1.4.2 British Columbia Parks 35
1.4.3 Regional District of Central Okanagan 37
1.4.4 City of Kelowna 40

Chapter 2: Theoretical Framework **43**

2.1 The Political Ecology of Hazard: Social Vulnerability to Natural Disturbance 44

2.2 Social Nature/Social Constructions of Nature 48

2.2.1 The 'Nature as Hazard' Perspective 53
2.2.2 The 'Nature as Aesthetically Valuable' Perspective 54
2.2.3 The 'Nature as Inherently Valuable' Perspective 57

2.3 Approaches to Forest Fire Mitigation Policy: Participatory Strategies for Living with Nature and Risk at the Wildland-Urban Interface 59

2.3.1 Incorporating Community Nature Perspectives into Public Education Programs for Disaster Mitigation 60
2.3.2 Encouraging Participatory Approaches to Fire Mitigation through Increased Communication and Trust-Building between Forestry Agencies and Community Residents 61

Chapter 3: Methodology **66**

3.1 The Study of Conceptions of Nature and Hazard: A Poststructural Approach to Analysis 67

3.1.1 Exploring Social Constructions of Nature through a Discursive Analysis of Text and Images 67
3.1.2 Ethics and the Influence of Feminist Approaches to Critical Research: Considerations of Positionality, Reflexivity, and Power Relations 71

3.2 Research Method 74

3.2.1 Analysis of Documents Pertaining to the Fire and its Aftermath 74
3.2.2 Interviews with Kelowna Residents 75
3.2.3 Photography Exercise 78
3.2.4 Limitations of the Research Approach 80

Chapter 4: Results **85**

4.1 The 'Forest as Hazard Perspective 86

4.1.1 Kelowna Residents' Initial Reactions to the Okanagan Mountain Park Fire, August 2003 86
4.1.2 Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Hazard' Perspective 93
4.1.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Public Lands in the City of Kelowna from the 'Forest as Hazard' Perspective 99
4.1.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and Other Forested Areas Surrounding the City of Kelowna from the 'Forest as Hazard' Perspective 101

4.2 The 'Forest as Aesthetically Valuable' Perspective 103

4.2.1 Kelowna Residents' Perceptions of their Community 103
4.2.2 Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Aesthetically Valuable' Perspective 111
4.2.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Public Lands in the City of Kelowna from the 'Forest as Aesthetically Valuable' Perspective 113
4.2.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and Other Forested Areas Surrounding the City of Kelowna from the 'Forest as Aesthetically Valuable' Perspective 114

4.3 The 'Forest as Inherently Valuable' Perspective

4.3.1 Residents' Interpretations of the Value of Forest Health 114
4.3.2 Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Inherently Valuable' Perspective 120
4.3.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Public Lands in the City of Kelowna from the 'Forest as Inherently Valuable' Perspective 123
4.3.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and Other Forested Areas Surrounding the City of Kelowna from the 'Forest as Inherently Valuable' Perspective 124

4.4 Community Contributions to Forest Fire Mitigation: Challenges and Opportunities 128

Chapter 5: Discussion **133**

5.1 The Varied Meanings and Priorities Placed on Ecologically Sustainable Forest Management and Community Safety among Kelowna Residents 133

5.1.1 The 'Forest as Hazard' Perspective 135
5.1.2 The 'Forest as Aesthetically Valuable' Perspective 137
5.1.3 The 'Forest as Inherently Valuable' Perspective 139

5.2 The Influence of Disaster on Perceptions of Nature 140

5.3 Steps Toward a more Inclusive and Participatory Approach to Forest Fire Mitigation in Kelowna 142

5.3.1 Addressing Residents' Nature Perspectives as part of Education Initiatives for Forest Fire Mitigation 143
5.3.2 Encouraging Communication and Establishing Trust: Incorporating the Nature Perspectives of Residents into Community Forest Fire Mitigation Strategies 147

Conclusion **155**

References **159**

Appendices **171**

List of Illustrations

Figure 1.1	Views of Kelowna, British Columbia	9
Figure 1.2	Images from marketing media for Kelowna's tourist attractions	11
Figure 1.3	Satellite image of devastation from the Okanagan Mountain Park fire, Kelowna, British Columbia	14
Figure 1.4	Maps displaying the percentage of pine killed by the mountain pine beetle in British Columbia in 1999 and 2009	18
Figure 4.1	Images of the 2003 Okanagan Mountain Park Fire, photographed by interview participants	87
Figure 4.2	Post-fire images, photographed in 2003 by interview participants	91
Figure 4.3	Photos provided by one interview participant, of neighbour's house and her own house	95
Figure 4.4	Image of destroyed homes with landscaping left intact, photographed shortly after the 2003 fire by interview participant	97
Figure 4.5	Images of appealing features of Kelowna photographed by one interview participant	104
Figure 4.6	Images of appealing features of Kelowna area photographed by one interview participant	106
Figure 4.7	Images of appealing features of Kelowna area photographed by one interview participant	107
Figure 4.8	Residential development and forest thinning on Knox Mountain Park, City of Kelowna, September 2008	109
Figure 4.9	Images of post-fire forest regrowth photographed by one interview participant	116
Figure 4.10	Image of post-fire regrowth photographed by one interview participant	117

Figure 4.11 Image of growth of fireweed in burnt forests, photographed by interview participant in June 2005 118

Figure 4.12 Images of unappealing features of Kelowna photographed by interview participants 122

List of Appendices

Appendix A	Interview Script for Kelowna Residents	171
Appendix B	Interview Script for Government Officials	175
Appendix C	Instructions to Participants for Photography Exercise	177

Introduction

Large-scale disaster events such as the wildfires in Los Angeles in 2008 and Hurricane Katrina in New Orleans in 2005 have accelerated an interest within hazards research in the social contributions to disaster vulnerability in North America. The scale of destruction to human lives and property resulting from natural events often stems from how settlements have been located and patterned, which can be attributed to a variety of social, political, economic and ecological factors (El-Masri and Tipple, 2002; Wisner et al., 2004; Wisner and Walker, 2005). Researchers increasingly acknowledge that community planning must address the likelihood of natural disturbance, and work within the underlying ecosystem processes of urban areas rather than attempt to overcome them (Etkin and Stefanovic, 2005; Findlay, 2002; La Point, 2007).

Significant research has been conducted with regard to flooding and hurricane events, exposing the precarious nature of technocratic measures in reducing risk to lives and property (Burby, 1998; Cigler, 1996). As a result of large-scale structural failures that have often increased the vulnerability of communities to natural hazards (as demonstrated in the failure of the levee system in New Orleans during Hurricane Katrina), researchers have explored the role of preserving natural features such as wetlands in reducing the effects of flooding within urban settings (La Point, 2007). In these cases, disaster mitigation policy and ecologically sustainable planning policy facilitate progress towards the same, or at least complementary, goals.

In the case of forest fires, forestry experts and governmental institutions in Canada increasingly expose the drawbacks of decades of previous forest fire management policies that relied on almost complete suppression of wildfires as part of a strategy to protect residents within the wildland-urban interface (WUI). Forestry and government officials now promote an understanding of the ways in which fire plays an important role in forest ecosystem function, by maintaining biodiversity, regenerating soil nutrients and reducing the unnatural build-up of combustible fuels in the form of excess vegetation (Hirsch, 2005; Natural Resources Canada, 2007). They also assert that the restriction of natural cycles of forest burning that were a part of forest ecosystems prior to suppression results in an increased risk of much larger wildfires that are more difficult to control, and that could potentially threaten neighbouring communities. In addition to putting lives and property at risk, it is widely believed that large-scale wildfires release significant amounts of carbon dioxide into the atmosphere, contributing to climate change (Natural Resources Canada, 2007).

The elevated risk of forest fires predicted as a result of climate change, due to a higher likelihood of drought and longer fire seasons, in combination with increased levels of development in forested areas presents numerous challenges for sustainable community planning in forested environments across Canada (Dellasala et al., 2004; Reinhardt, 2008). Due in part to the significant proportion of Canadian urban forest that exists on privately held land, forest fire mitigation practitioners and government policymakers often advocate a holistic approach to urban forest management that requires the active support and participation of all community members in the implementation of

successful forest fire mitigation approaches (Hirsch, 2005; Kenney, 2003; Shindler, 2007; Winter & Fried, 2000).

This research is based on an extended case study of the municipality of Kelowna, which borders on forested public lands within the Southern Interior region of British Columbia. This community was significantly impacted by wildfire in August 2003; 238 homes were destroyed and thousands of residents were evacuated (B.C. Ministry of Forests and Range, 2008). During the post-disaster reconstruction period, several recommendations were made to revise provincial and municipal fire mitigation strategies in the form of, among other things: a provincially-led review of fire response and forest management; a municipal land use planning review; and the distribution of a homeowners' forest fire mitigation manual that contains recommendations for fire safe measures around individual properties (Filmon, 2004; B.A. Blackwell & Associates, 2006; Partners in Protection, 2007). These policy recommendations, if adopted, would require community members to implement and/or support land use practices that alter local forest ecosystems in order to reduce risk to their city from wildfire.

The threat of fire provides an additional dimension to ecologically sustainable community planning in forested areas that requires, in some cases, for trade-offs to be made between preserving vegetation within and surrounding the city, and providing increased safety from the potential threat of future fires. The fire mitigation policies that have been recommended for Kelowna are aimed at reducing the density of vegetation (in many cases, removing trees) in order to reduce the threat of large-scale fires. As the success of forest fire mitigation efforts often relies on the support of community residents, this thesis explores the ways in which the implementation of disaster mitigation

recommendations is potentially complicated by differing interpretations among community members regarding the ecologically sustainable and fire safe management of local forests.

The main goals of this research are first, to gain a deeper understanding of the complex ways in which Kelowna residents have chosen to place meaning on forest health and community safety within their own lives; and second, to explore the ways in which community policies for ecological sustainability and disaster mitigation can be enriched by this breadth of perspectives. More specifically, this research addresses the following questions:

> *In the aftermath of the devastating effects of the 2003 Okanagan Park Forest Fire, how is acceptance or rejection of forest fire mitigation recommendations within the municipality of Kelowna, British Columbia, influenced by the varied meanings and priorities placed on ecologically sustainable forest management and community safety by residents within the community?*
>
> *How are perceptions of nature (in this case, urban forests) that are held by residents within the community influenced by disaster?*
>
> *How can these perspectives be incorporated into an inclusive and participatory approach to forest fire mitigation in Kelowna?*

Chapter 1 will establish the contextual background for this study, by identifying several physical, social, economic and ecological aspects of the city and its surrounding forests that have influenced residents' nature perspectives, and by exploring other, more extensive factors regarding current forest research and governmental policy that warrant a more participatory approach to the development of forest management and fire mitigation strategies for Kelowna. Chapter 2 will provide the conceptual framework within which this research is situated, by first exploring the ways in which vulnerability to disaster

(either imposed or voluntary) is shaped by social, political and economic factors. The concepts of social nature and social constructions of nature will then be introduced, as means to explore how populations relate to their surrounding ecologies, and to identify links between differing knowledges of nature and the actions taken or not taken by residents to protect communities and forests. This will then be followed by an examination of works that establish paths towards increased public involvement in forest management and disaster mitigation strategies.

Chapter 3 will provide an overview of the methodological approach employed in this study: a discursive analysis of sources that explore residents' nature perspectives and reactions to mitigation policy, consisting of literature documenting the impacts of the fire on Kelowna residents, interviews with government officials and Kelowna residents, as well as photographs provided by interviewees. Chapter 4 will display the results of the study (i.e. residents' responses), which are organized according to several predominant nature perspectives that have been established as part of the theoretical framework for this research (as introduced in Chapter 2). At the end of the chapter, ideas expressed by forestry officials and residents regarding potential participatory approaches to forest fire mitigation will also be presented.

Chapter 5 will provide an analysis of the ways in which residents' nature perspectives have motivated their reactions to mitigation policy, the influence of the 2003 fire on these perspectives, and potential avenues for community involvement in forest management and fire mitigation that incorporate these perspectives, based on the results presented in Chapter 4. This chapter will then be followed by concluding statements in

which key points of the study will be summarized, and potential paths for future research will be identified.

Chapter 1: Context

Chapter 1 presents an overview of the context within which researchers, government officials and the general public (in particular, Kelowna residents) influence policies for the management of natural environments and fire hazards. Section 1.1 describes several physical and social aspects of the Kelowna area that influence residents' nature perspectives and participation in community strategies for forest management, which include the city's rapidly growing population, its substantial tourist economy, and recent sustainability initiatives that have been undertaken by the municipality. This section also describes the severe impacts of the 2003 Okanagan Mountain Park fire on the community, emphasizing the substantial degree of threat this disturbance posed to Kelowna residents. Section 1.2 describes the physical aspects of forested ecosystems in and around Kelowna, and includes an examination of what is currently known (and somewhat debated) regarding fire behaviour in these types of ecosystems based on the influences of climate and historical patterns and frequency of burning.

Section 1.3 explains past and present forest management and fire mitigation strategies in North America since European settlement, making links between predominant societal attitudes, advances in scientific research, and changes to mitigation policy over the last century. This section highlights the complexity of the knowledge-gathering process among those who are involved in the development of forest and fire management strategies, in particular the uncertainty that exists regarding such issues as the future impacts of human influences on forest health and fire behaviour such as climate change and continued fire suppression, as well as the debate surrounding the most

effective and responsible means of mitigating damage to communities from fire disturbance events. This section also outlines the three policy documents that are employed in this study to gauge Kelowna residents' reactions to fire mitigation recommendations for the city. Lastly, Section 1.4 details current strategies for the mitigation of forest fires that are implemented among the provincial, regional and municipal agencies that govern forest management policy in and around Kelowna.

1.1 The City of Kelowna, British Columbia and the Okanagan Mountain Park Fire

1.1.1 The City of Kelowna, British Columbia

The City of Kelowna has a population of approximately 113,000, and is located in the southeast interior of British Columbia (City of Kelowna, 2008) (see Figure 1.1). Kelowna has been and continues to be an area of significant population growth; in the 20 years between 1986 and 2006, the population grew by 72%, and the city is projected to grow to a population of 272,000 by 2026 (City of Kelowna, Planning and Development Services Department, 2008; Simmons and McCann, 2006).

Due in large part to its scenic location within the mountains of the Okanagan region, as well as its moderate climate, Kelowna is a popular tourist and retirement destination, and the city actively represents itself as a location for outdoor activities within a forested setting such as hiking, mountain biking, skiing and horseback riding. Several provincial parks and sites of interest lie just outside the borders of the city, including Okanagan Mountain Provincial Park, Myra-Bellevue Provincial Park, and the Kettle Valley Railway trail, which is a popular national heritage site that offers spectacular views for hiking and biking on the site of a former train route. The large

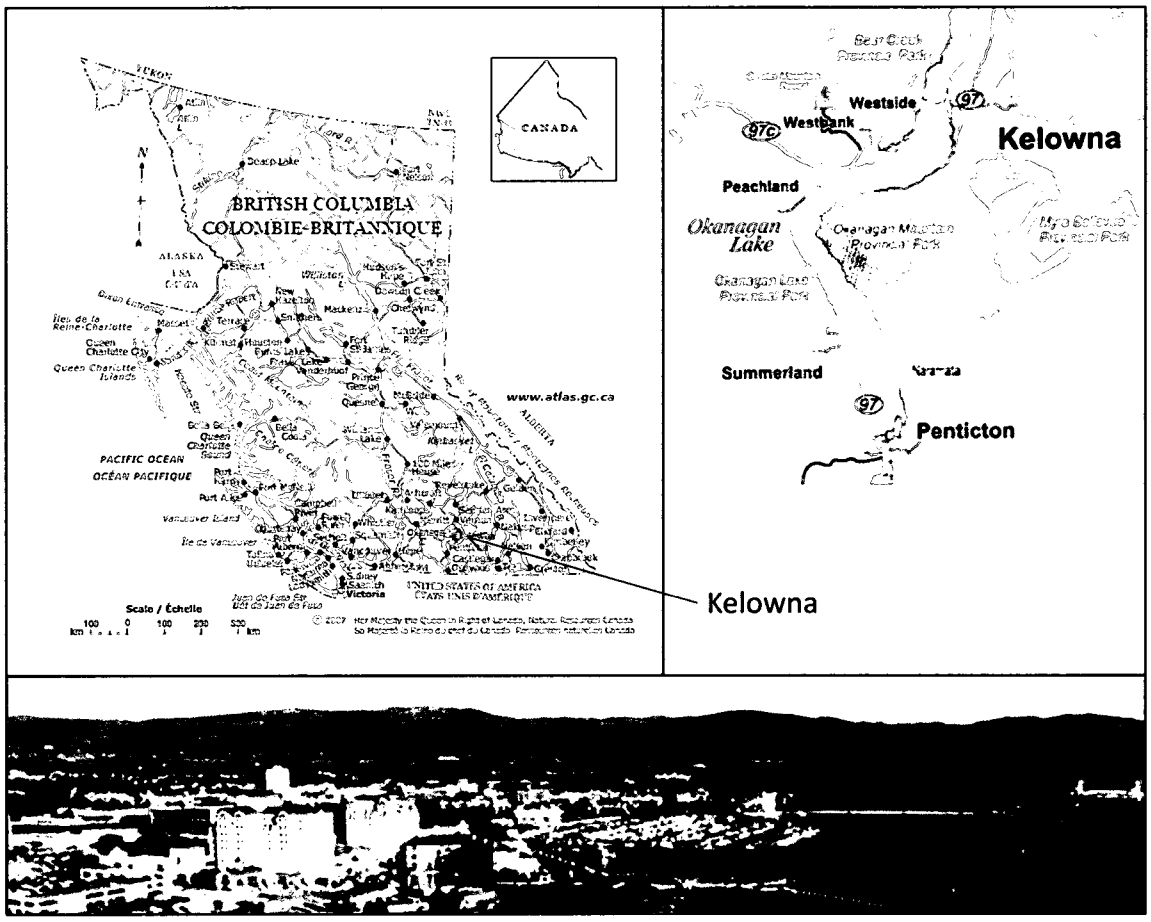

Figure 1.1: Views of Kelowna, British Columbia. (a) top left: location of Kelowna within the province of B.C.; (b) top right: Location of Kelowna within the Okanagan region, just north of Okanagan Mountain Provincial Park and Myra Bellevue Provincial Park; (c) bottom: Photo of the city with the mountains of Okanagan Mountain Provincial Park in the background. From (a) *The Atlas of Canada: British Columbia* by Natural Resources Canada, 2009. Retrieved January 5, 2009 from http://atlas.nrcan.gc.ca/site/English/maps/reference/provincesterritories/british_columbia/map.pdf; (b) *Kelowna Visitor's Choice* by Tourism Kelowna, 2007; (c) *Super, Natural British Columbia: Kelowna* by Tourism British Columbia, 2009. Retrieved January 5, 2009 from http://www.hellobc.com/en-CA/RegionsCities/Kelowna.htm

trestles that were a main attraction of the railway trail were destroyed during the 2003 Okanagan Mountain Park fire, and were reopened in 2008 after being restored at an approximate cost of $15 million (Aguiar et al., 2005; City of Kelowna, 2008d; Hystad and Keller, 2008).

The growth of the tourism industry has also influenced the development of a number of privately run attractions within natural settings that are geared towards upper-income residents and visitors. The increasing number of golf courses in Kelowna, set among spectacular views of treed mountains and hills that surround the city, have been marketed to retirees as part of a lifestyle that is relaxing, restorative, and symbolic of an 'ongoing vacation'; as Aguiar et al. (2005, 129) suggest, "The idyllic image of retirement includes the outdoors, a never-ending playground, a pre-work, child- and adolescent-like life." Several resorts that have been developed within the mountains surrounding the city offer younger visitors and residents the ability to experience some of the natural features of the area in relative comfort. Resorts such as Big White Ski Resort and Silver Star Mountain Resort, both east of the city, provide ski and après-ski activities in winter, as well as challenging summer mountain biking trails (Ibid; Big White Ski Resort, 2009; Silver Star Mountain Resort, 2009) (see Figure 1.2).

Kelowna's municipal government has developed several strategies towards increased ecological sustainability within the community. In 2007 and 2008, Kelowna placed second in the *Green Cities* awards program administered by the province of British Columbia (City of Kelowna, 2008c). In 2006, the city organized a public consultation and associated survey entitled *FUTUREOK Initiative*, with a primary purpose to develop a 'locally-generated definition of sustainability' (Bagh, 2006, 7) that

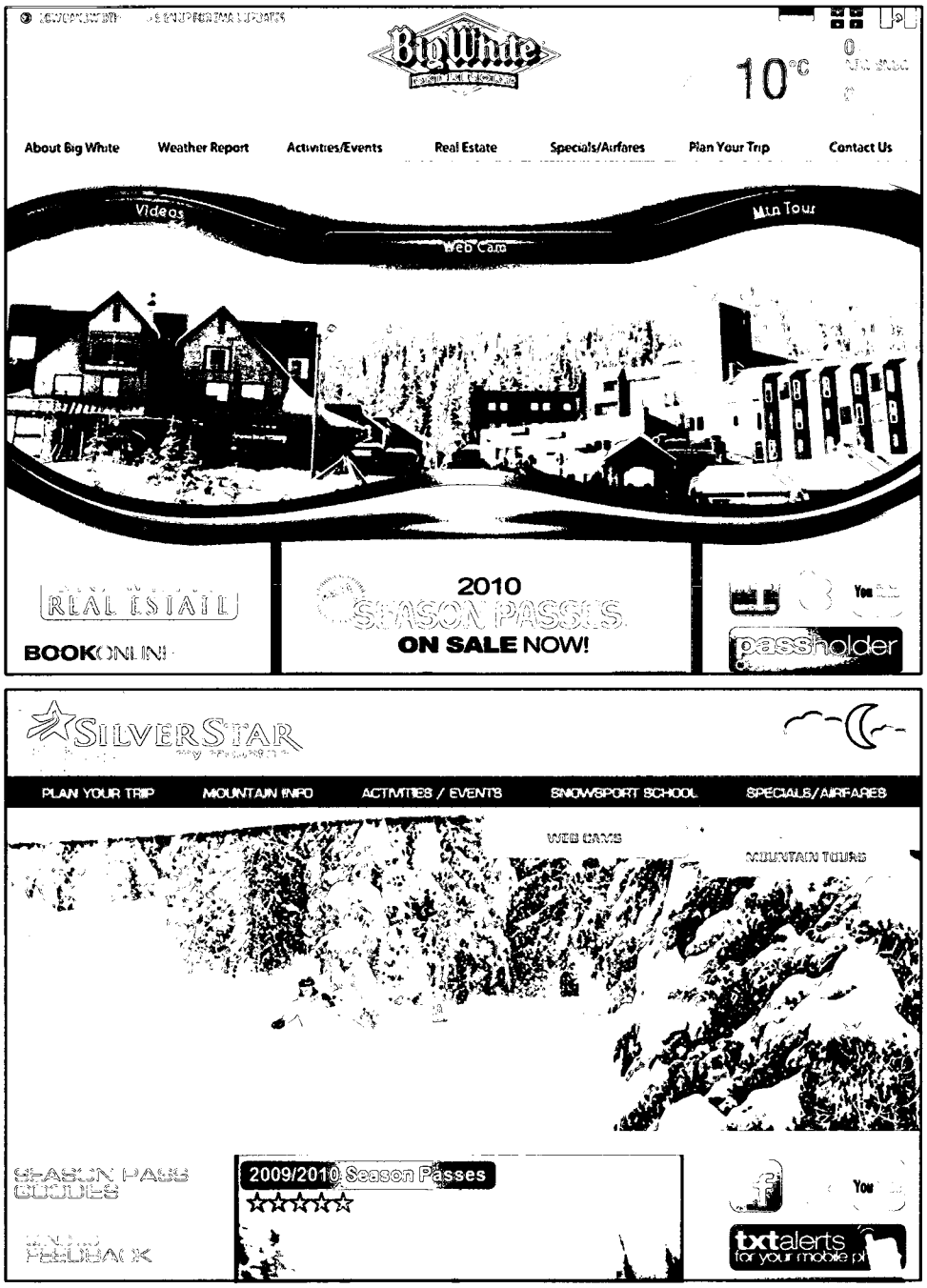

Figure 1.2: Images from marketing media for Kelowna's tourist attractions. From *Welcome to Silver Star Holidays* from Silver Star Mountain Resort, 2009. Retrieved June 2, 2009 from http://www.skisilverstar.com/home_showSection_ID_623.html; *Welcome to Big White!* by Big White Ski Resort, 2009. Retrieved June 2, 2009 from http://www.bigwhite.com/index.php?fuseaction=home.showSection&ID=174

included economic, cultural and ecological considerations. Within the portion of the survey dedicated specifically to ecological issues, 'green space' was cited by the highest number of respondents as an aspect of the community that residents would like to sustain over the long term (Ibid, 14). The municipality is also revising its Official Community Plan as part of an initiative entitled *Kelowna 2030*; one of the main intents of the new plan is to incorporate increased measures towards community sustainability. As part of this effort the City is seeking input from Kelowna residents through strategies such as an open house and public survey in order to solicit feedback on a draft version of its revised plan (City of Kelowna, 2008a).

1.1.2 The Okanagan Mountain Park Fire

The Okanagan Mountain Park fire began on the night of August 16, 2003, ignited by a lightning strike during a period of prolonged hot and dry weather conditions. Initial efforts by the provincial Ministry of Forests and Range to contain the fire were not successful, attributed in part to the relatively remote and inaccessible terrain within which the fire first began to spread (B.C. Ministry of Forests and Range, 2003; Filmon, 2004). Spurred by strong winds and dry forest vegetation, the blaze eventually grew into a Rank 6 crown fire, which is defined as the 'most lethal' of this type of disturbance (Freake and Plant, 2004, 94). The fire was reported to have moved across the whole area of Okanagan Mountain Park (equal to approximately 13,000 hectares) within a period of four days (Ibid).

During the most intense period of the fire, spotting distances for burning embers at times extended from 100 metres to several kilometres in advance of the main fire; in some cases this caused damage to homes and vegetation that were not located in the fire's direct path (B.C. Ministry of Forests and Range, 2003; M. Kopp, personal communication, December 16, 2008). According to a report released by the Ministry of Forests and Range, "Seasoned firefighters who were on the line and out-of-province specialists all described conditions as the most volatile ever experienced in Canada" (B.C. Ministry of Forests and Range, 2004, 25). Over the course of the fire, 33,000 residents in and around Kelowna were evacuated, and 238 homes were significantly damaged or completely destroyed. By the time the fire was mostly contained in September 2003, almost 26,000 hectares of forested land surrounding Kelowna had burned, and over $200 million in damages were incurred (B.A. Blackwell & Associates Ltd., 2006; B.C. Ministry of Forests and Range, 2008; Freake and Plant, 2004) (see Figure 1.3).

1.2 Physical Characteristics of Forests and Forest Fires within and surrounding Kelowna

The climate in the Okanagan is generally warm and dry during the growing season, with frequent potential for summer drought. Forests within this region support a large and diverse mix of vegetative and wildlife species, many of which are known to be at risk due to influences such as encroaching development and the threat of widespread exotic species invasions.

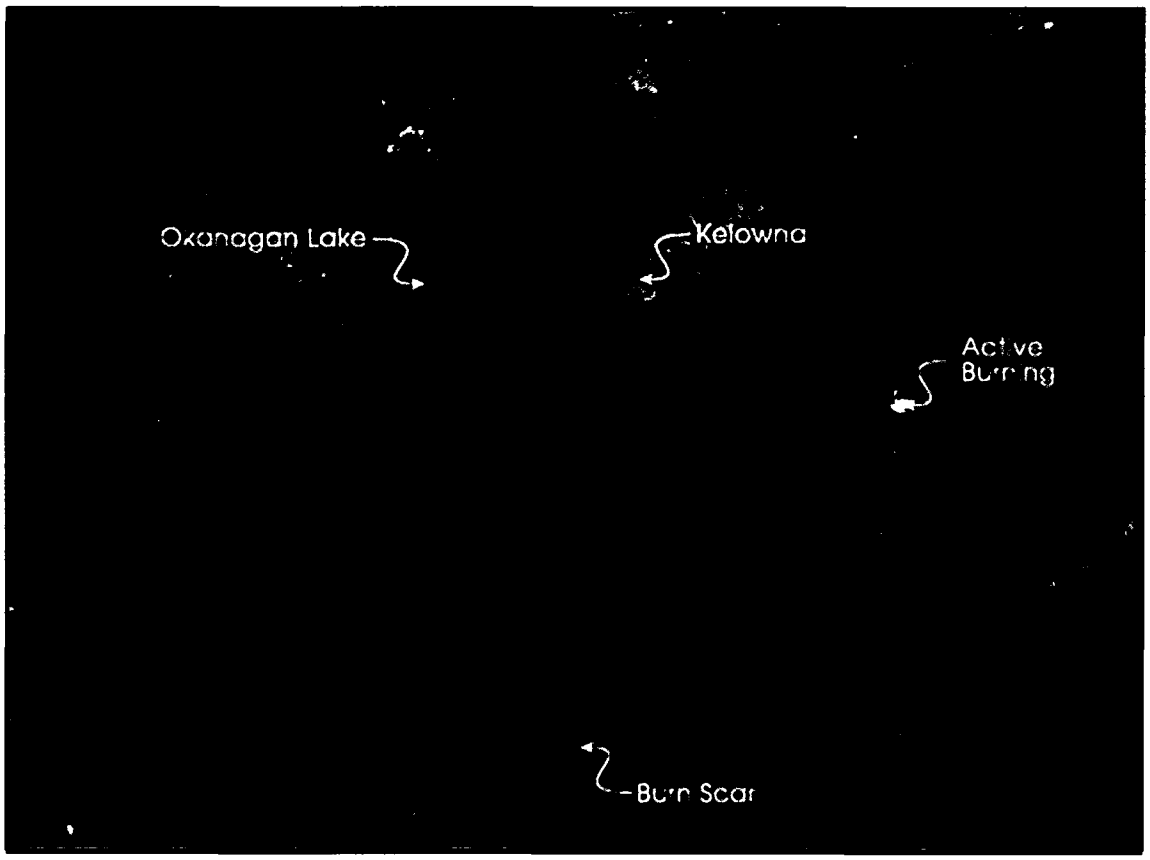

Figure 1.3: Satellite image of devastation from the Okanagan Mountain Park fire, Kelowna, British Columbia, September 2, 2003. Large pink area denotes burn scar that covers most of Okanagan Mountain Park. From *Okanagan Fire, B.C.* by NASA Earth Observatory, 2003. Retrieved February 12, 2009 from http://earthobservatory.nasa.gov/IOTD/view.php?id=3766

Kelowna area forests generally lie within the Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones. Grasslands grow predominantly among valley bottoms, though they can also be dispersed throughout higher elevations. Ponderosa pines are found above the Bunchgrass zone, though still within lower elevations, while Douglas-firs grow most commonly at low- to mid-elevations, generally above Ponderosa Pine zones. Lodgepole pine is another common coniferous species in the region, and is found at higher elevations. In areas that were historically subject to forest fires, Douglas-firs, ponderosa pines and lodgepole pines have survived and often adapted to fire conditions. Fire has also influenced the growth of grasslands in the region; these grasslands have now gradually diminished within areas of prolonged fire suppression (Hope et al., 1991a; Hope et al., 1991b; Nicholson et al., 1991).

Several provincial, regional and municipal agencies are responsible for fire mitigation in forests in and around Kelowna. B.C. Parks manages forests within surrounding provincial parks, while the provincial Ministry of Forests and Range is primarily responsible for fire management in other forested crown lands that surround Kelowna (B.C. Ministry of Environment, 2009; B.C. Ministry of Forests and Range, 2004). The Regional District of Central Okanagan controls forests that are a part of regional parks within the area known as the Central Okanagan Region; several of these parks are situated within the Kelowna area, including Mission Creek Regional Park in central Kelowna, as well as Kalamoir Regional Park in the neighbouring Village of Westbank (M. Kopp, personal communication, December 16, 2008). At the municipal level, the City of Kelowna manages forests within city-owned parks and public spaces, and mitigation of forest fuel accumulation is organized by the city's Urban Forestry

Supervisor (I. Wilson, personal communication, August 8, 2008). Private property owners (including owners of individual residences) within the city are responsible for mitigation of fire risk within their own properties, a substantial aspect of which is the management of local vegetation. Kelowna's fire department is primarily responsible for providing information and guidance to Kelowna homeowners regarding effective and fire-safe mitigation strategies (R. Blanleil, personal communication, December 12, 2008).

There exists relatively limited documented information about the fire disturbance history of the Southern Interior region of British Columbia. It is often suggested that prior to large-scale settlement, five- to twenty-year cycles of low-intensity fires cleared excess brush within forests in British Columbia's Okanagan region, while for the most part preserving older and larger-growth trees (Filmon, 2004; Freake and Plant, 2004; Heyerdahl et al., 2007). For example, one report has suggested that forests within Okanagan Mountain Park had missed three 'disturbance intervals' (i.e. naturally occurring, low-intensity fires that would have reduced the density of vegetation in area forests) over several decades prior to the 2003 fire, due to prolonged fire suppression in the area (Filmon, 2004, 25). Others have proposed that the area historically experienced more of a mixed-severity regime, in which both recurrent, low-intensity and less frequent 'stand-replacing' fires were known to occur (B.A. Blackwell & Associates, 2007; Klenner et al., 2008).

The prevailing view is that currently, as the result of years of previous fire suppression policies, the species makeup of British Columbia's forests has been significantly altered, and the understory vegetation that would have otherwise been removed from these forests has remained and increased in density over time. As a result,

any forest fires that do take hold out of the control of forest agencies have the potential to advance upward from lower levels of thick forest brush to the taller treetops (i.e. crowns) overhead; this is a process that then leads to much larger, more intense and potentially damaging crown fires, similar to what is believed to have occurred during the Okanagan Mountain Park disturbance (B.C. Ministry of Forests and Range, 2004; Natural Resources Canada, 2007; Reinhardt et al., 2008).

Within the last few years, approaches to fire management within British Columbia forests have faced additional challenges due to the rapid spread of infestation of the pine beetle. The main threats in this respect come from the western pine beetle and the mountain pine beetle. The western pine beetle primarily attacks ponderosa pines. The more aggressive mountain pine beetle attacks both lodgepole and ponderosa pines, and has spread southward over the last decade from northern B.C., now threatening to affect a significant percentage of forests within the Okanagan region. For example, approximately 80% of Kelowna's ponderosa pine trees (which currently amount to 24% of trees in Kelowna overall) are expected to be destroyed by the pine beetle by 2013 (Wilson, 2007; Wilson, 2008). Pine beetle populations are usually reduced during prolonged periods of -40°C winter temperatures or wet summer seasons, both of which are relatively infrequent in the Okanagan region (Hoekstra, 2007). Figure 1.4 illustrates the devastating impact and progression of the pine beetle infestation in B.C. during the ten years between 1999 and 2009.

There is evidence to suggest that forest fire mitigation and pine beetle infestation are connected. It has been proposed that altered forest conditions resulting from a

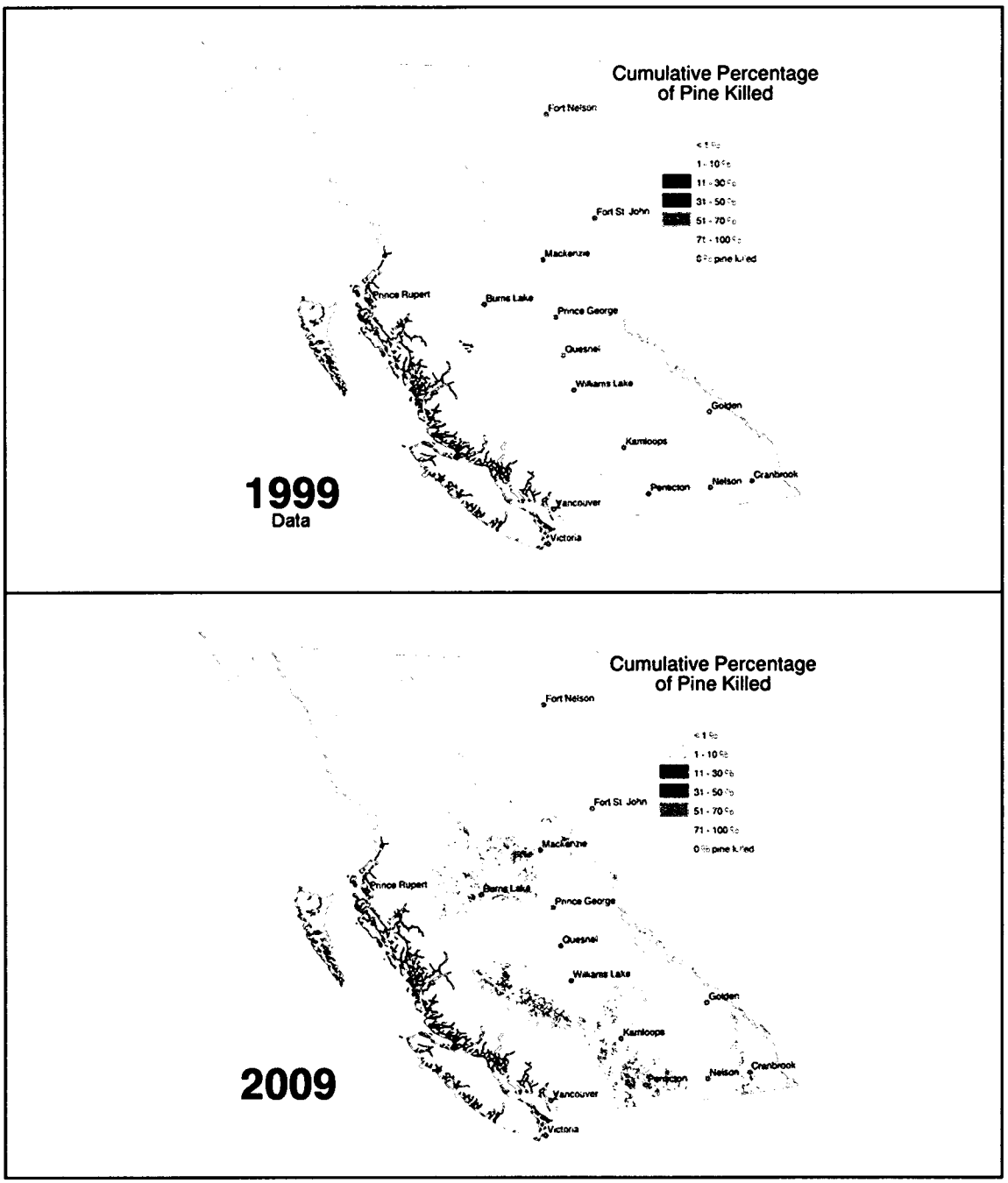

Figure 1.4: Maps displaying the percentage of pine killed by the mountain pine beetle in British Columbia in 1999 (top) and 2009 (bottom). From *Mountain Pine Beetle Status Map 1999* and *Mountain Pine Beetle Status Map 2009* by B.C. Ministry of Forests, 2009. Retrieved July 7, 2009 from http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/maps/Culm_kill_1999.jpg and http:www.for.gov.bc.ca/hfp/mountain_pine_beetle/maps/Culm_kill_2009.jpg

prolonged period of fire exclusion within these areas, in combination with factors such as climate change, has increased the vulnerability of pine forests to pine beetle infestations, as, "High tree densities...increase competition for moisture and nutrients resulting in greater insect and disease susceptibility" (B.A. Blackwell & Associates, 2007, ii). Filmon (2004, 30) also notes, "Lack of natural wildfire has allowed the amount of mature lodgepole pine to increase to three times its normal occurrence in Interior forests. Lodgepole pine is the main tree species used by mountain pine beetle to carry out its life cycle."

Regardless of the future outcome of this infestation, the substantial increase in dead trees that has already resulted from previous insect attack has provided a corresponding increase in what is considered to be rather combustible forest fuel. As a result, it has been suggested that fires could potentially ignite and spread more quickly among regions of dead and dry forest within the first 15 years following a pine beetle infestation (B.A. Blackwell & Associates, 2007; Born et al., 2007). In the case of the Okanagan Mountain Park fire, the majority of trees burned were ponderosa pines. The remaining higher-elevation lodgepole pines, if infested, could result in a substantial increase in dead and dry forest material, thereby elevating the future threat of other large-scale forest fires in the park (B.C. Ministry of Forests and Range, 2004; M. Ladd, personal communication, August 15, 2008).

1.3 The Evolving Science, Politics and Policies of Forest and Forest Fire Management in North America

1.3.1 A Recent History of Forest Fire Management in North America

Varying perspectives existed regarding the benefits and risks of fire in forests during the initial period of European settlement within regions of the United States and Canada. Controlled burns were frequently employed during this time by settlers in order to remove portions of forest and clear land for new and expanding farming properties (Arno and Allison-Bunnell, 2002; Born et al., 2007). Within the United States, heightened resistance to employing controlled burns, and an associated increase in calls for the suppression of forest fires in general were the result of the growing perception of fire as a threat to the expanding development of large-scale settlements by European immigrants to the western United States during the early 1900s; this has been described as a period in which '[c]ivilization seemed pitted against untamed nature' (Arno and Allison-Bunnell, 2002, 12). The perception of fire as a damaging force was also influenced by a concern for the welfare of forests in general, as expressed by a growing forest conservation movement that became established in the United States in the early Twentieth Century. As the middle of the century approached, suppression policies grew in prominence and were increasingly funded by the federal government, while any research that may have revealed the potential benefits of fire disturbances in forests was also suppressed (Ibid).

In the late 1800s and early 1900s in Canada, support by both government and the general public for more assertive approaches to forest fire suppression was the result of several factors: the growing numbers of forested communities that suffered damage as a result of large-scale wildfires, concerns expressed by forest industries regarding the

potential loss of forest resources from fire, and the influence of an 'adopted European approach to fire exclusion' (Born et al., 2007, 3; Filmon, 2004; Hirsch, 2005). However, despite the abundance of forest resources and associated economic benefits that were made available through active suppression of fires within Canada's forests during this period, the last quarter of the Twentieth Century brought an increasing awareness of the prohibitive economic costs associated with maintaining extensive fire suppression policies. It also became more widely accepted that continued suppression resulted in greater densities of forest fuels, that would normally have been removed during more frequent cycles of smaller fires within forests in the absence of human intervention. Without the removal of these fuels, the risk of unusually large-scale fire events was thought to greatly increase. The advancement of ecology science since the late 1970s, explored through federal agencies and university research departments across Canada, also helped to promote increased awareness of the potential benefits of fire disturbance for the healthy function of forest ecosystems (Born et al., 2007; Hirsch, 2005; Natural Resources Canada, 2007).

Over the last century, fire behaviour in some North American forested ecosystems has been influenced by human-induced modifications other than fire suppression. These changes have included methods of commercial tree harvesting in which older, more fire-resistant trees were removed, leaving a more homogenous and smaller-diameter forested landscape; increases in forest debris left behind from commercial logging projects; and tree replanting methods that resulted in more densely patterned forests than were originally a part of these ecosystems (Brown et al., 2004; Dombeck et al., 2004; Filmon, 2004).

Today, there is increasing acknowledgement within many of the forested areas of North America of the diversity of social, economic and ecological concerns to be addressed as part of forest management and forest fire mitigation. The many stakeholders involved include forest practitioners, various levels of government, community and environmental groups, and other members of the general public, often with differing opinions regarding how efforts towards environmental protection and community safety can and should be achieved.

A current effort in forest fire management promotes the value of ecological restoration in order to maintain safer and healthier forest conditions. However, even some of those in favour of this approach note that attempts to manage forest ecosystems in ways that would mimic conditions prior to European settlement are not possible or appropriate, due to the proliferation of exotic species and new diseases that became a part of some of these forested landscapes as a result of more intensive development (Brown et al., 2004; Reinhardt, 2008). With the predicted increase in forest fire risk that will result from the influence of climate change (which includes a warmer and drier climate with a greater frequency of lightning, a longer fire season, and a longer growing season that will most likely result in an increase in forest density), managing for fire in the best interest of ecosystem health and community safety is difficult to gauge (Dellasala et al., 2004; Hirsch, 2005; Reinhardt, 2008). As well, given the uncertainty that exists from year-to-year regarding climate conditions, it has become increasingly evident that the complete eradication of forest fires, even in the most vulnerable areas of the wildland-urban interface, is not appropriate or possible. As Dellasala et al. (2004, 982) note, "No fuel-hazard reduction project can significantly reduce the severity or extent of a fire ignited in

the summer, in the middle of a drought, that is burning on a day with high temperatures and winds."

Forest researchers increasingly assert that the prevention of large-scale forest fires through mitigation strategies that reduce forest fuels can have ecological benefits as well. As forest fuels increase as a result of prolonged fire suppression, larger fires that sometimes occur could potentially have negative effects on soils, aspects of watershed function such as water quality maintenance and flood prevention, and some forest species habitats (Brown et al., 2004; Dellasala et al., 2004; Dombeck et al., 2004; Natural Resources Canada, 2007). At the same time, it is now frequently acknowledged that the complete removal of fire disturbance is not in the best interest of forest health. The ecological benefits of fire within forests are believed to include: the maintenance of the diversity and structure of many forest species in addition to trees, the regulation of diseases and insect infestations, the creation or preservation of wildlife habitats, and increased forest resiliency (among some tree species) to future fires. As a result, there has been a call for the restoration of a greater degree of 'ecological integrity' to these landscapes in order to allow forest ecosystems that have historically been adapted to fire disturbance to more easily regulate themselves (Dellasala et al., 2004: 980; Dombeck et al., 2004; Hirsch, 2005; Natural Resources Canada, 2007; Reinhardt, 2008).

As part of this effort, forest and forest fire management strategies have progressed from individual stand level to broader landscape-level assessments, in order to address the spatial and temporal heterogeneity of forest landscape conditions and patterns of fire disturbance. For example, the study of some patterns of forest burning has revealed that large scale fires do not completely destroy forest ecosystems; some forested areas remain

intact (Reinhardt et al., 2008). As well, forest researchers increasingly recognize that large wildfires will not be prevented if forest fuel modifications are made only within relatively small, dispersed areas (Brown et al., 2004; Dellasala et al., 2004).

As a result of these types of observations, forestry experts who prioritize ecosystem health as part of disaster mitigation efforts have made a variety of recommendations. In general, aspects of forest ecosystem function such as soil nutrient requirements and the general health of the watershed must be considered as part of the fuel reduction process (Dombeck et al., 2004). The active management of forest fuels should occur primarily within areas that contain the most risk for neighbouring urban sites, with comparatively less intervention within more ecologically fragile areas and unpopulated wildlands (Dellasala et al., 2004; Kauffman, 2004). In areas where active management does occur, care should be taken to avoid the introduction of exotic species, and to preserve wildlife habitats during post-fire salvage events (Dellasala et al., 2004; Reinhardt, 2008). Wei et al. (2003) also recommend that tree removal as part of the commercial harvesting process can and should mimic patterns created by natural disturbance.

1.3.2 Specific Mitigation Strategies

Several options exist for forest fire mitigation in WUI areas with the primary purpose of removing excess vegetation. Brown et al. (2004, 903) comment that, "...the types of thinning and fire and where they are applied are the subjects of much debate." The type of strategy chosen is based on various factors, including the degree of risk of potential forest fire damage relative to neighbouring settlements, community concerns, forestry budgets, as well as the degree to which forestry officials attempt to emulate natural forest

ecosystem conditions. Specific mitigation strategies include: prescribed burns, set by forestry officials under strictly controlled conditions; mechanical tree removal, employed either sporadically to reduce the density of vegetation in forested areas, or more aggressively to remove entire sections of forest in order to provide a complete barrier to the spread of fire to neighbouring built settlements (i.e. fuel breaks); and the replacement of flammable vegetation (i.e. conifers) with less flammable species (e.g. deciduous trees and shrubs).

Those in support of prescribed fire maintain that this strategy allows for more cost-effective fire mitigation at a more extensive scale. In mimicking historic processes of burning, it is asserted that this process most closely resembles natural forest ecosystem conditions, and, unlike mechanical thinning, provides additional ecosystem benefits beyond the reduction of large-scale fire risk (Kauffman, 2004; Reinhardt, 2008). Brown et al. (2004) suggest that the implementation of controlled burns is particularly beneficial in forests with fire resistant species such as ponderosa pine and Douglas-fir. It has also been suggested that the use of prescribed burns is ultimately a more fire-safe approach which can potentially remove significant sections of combustible surface growth; this is compared to the process of mechanical thinning, in which trees and large brush are removed while flammable clippings and other surface fuels are often left behind, subject to the drying effects of greater exposure to sunlight and surface wind. The use of mechanical thinning is often recommended within populated areas where concerns have been expressed about smoke and the risk of out-of-control burns, as well as within wildland areas as part of commercial logging strategies (Brown et al., 2004; Kauffman, 2004).

It is frequently suggested that an efficient approach to forest fire mitigation is to combine mechanical thinning with prescribed burns. For example, thinning could first be employed to remove mid- and upper-level forest growth, with controlled burning then applied to reduce remaining surface fuels (Dellasala et al., 2004; Dombeck et al., 2004; Reinhardt, 2008). Brown et al. (2004, 905) cautiously support this approach, but also cite concerns that the use of extensive controlled burning could potentially "...homogenize the landscape, create smoke problems, and damage wildlife habitat." Reinhardt et al. (2008) suggest that prescribed burning be applied to wildlands, while mechanical thinning would best be employed within more populated WUI areas.

Several perspectives exist regarding the most efficient and effective approaches to protecting residential neighbourhoods that are located at the wildland-urban interface. Researchers increasingly stress the importance of managing vegetation within areas immediately surrounding a home (i.e. within a 30 to 60 metre radius of the home) as the primary source of protection against wildfire. Forest fuel management within residential properties, in combination with the use of less-flammable building materials (e.g. by avoiding exterior surfaces such as asphalt roofing shingles), has been shown to significantly reduce the chance that a home could ignite, often regardless of the severity of the surrounding fire (Cohen, 2000; Kauffman, 2004; Reinhardt et al., 2008). Summarizing the research of Cohen (2000) on this topic, Kauffman (2004, 881) explains:

> If the house cannot ignite, it will not burn. Cohen and colleagues found that even high-intensity crown fires will not directly ignite homes at distances beyond approximately 60 metres (200 feet)....Therefore, wildland fuel characteristics beyond the home and its immediate surroundings have little if any significance for WUI home losses.

As a result of these research findings, it has been suggested that fuel thinning within large forested areas that are adjacent to communities, while necessary, can only prevent damage to neighbouring residential properties to a certain degree in the absence of additional fuel management measures immediately surrounding homes. Homes in these areas are also potentially damaged by burning embers that may travel long distances in advance of the main wildfire source, igniting on local building structures and vegetation (Filmon, 2004; Kauffman, 2004; Manzello et al., 2008; Partners in Protection, 2007; Reinhardt et al., 2008). Kelowna's Fire Chief has insisted that some individual home ignitions not in the direct path of the 2003 Okanagan Mountain Park fire could have been prevented through proper maintenance of vegetation on individual properties (for example, by removing flammable vegetative debris from roofs, as well as the cedar bushes and ponderosa pines in close proximity to area homes that provided the sources for this debris). As he describes,

> I can remember flying in the air on the night of August 22nd [2003], and seeing residents with many many roofs on fire – those are all ember transplant fires, those roof fires....The fire was still significantly up into the forest at that time. And all of those fires...could have been prevented with proper maintenance of the area that was impacted. (R. Blanleil, personal communication, December 12, 2008)

Due to this type of occurrence, some researchers have also suggested that fuel breaks surrounding residential settlements may have limited effectiveness in preventing damage to homes during a large-scale wildfire (Kauffman, 2004; Reinhardt et al., 2008; Stephens, 1998).

1.3.3 Current Forest Fire Management Policy at the National Level

Today, the suppression of forest fires is still actively implemented in the vast majority of Canadian forests; 97% of all fires are contained to an area of less than 200 hectares (Hirsch, 2005). Most of Canada's existing forested areas, approximately 93% of the total 402 million hectares, are publicly owned; within this percentage, the majority is managed by the provinces and territories, while a substantially smaller proportion (e.g. national parks) is managed by the federal government. Fire suppression is implemented for several reasons: to protect neighbouring communities from fire damage and excess smoke, to protect timber resources, and to reduce potentially significant carbon emissions (i.e. emissions resulting in climate change) that would be generated during large scale fire events. Annual fire suppression costs within these forested lands currently fall between $400 million and $800 million, but can reach up to $1 billion during exceptionally hot and dry fire seasons (Born et al., 2007; Hirsch, 2005; Natural Resources Canada, 2007). The general approach towards forest fire suppression that currently exists across Canada consists of two levels: intensive and extensive. More intensive protection (i.e. almost complete suppression) from fire is provided for communities at the wildland-urban interface (WUI), recreation areas, and forests containing valuable timber resources. In extensive zones, fires are allowed to burn more freely as long as perceived 'social or resource values' are not at risk (Born et al., 2007; Natural Resources Canada, 2007). As a recent publication from Natural Resources Canada (2007) describes, "The key [of federal mitigation policies] is to balance the costs and benefits of fire to help ensure the ecological, economic and social sustainability of our forests, the forest industry and forest-based communities."

In recent decades federal forestry agencies have attempted to address the many and varied environmental, social and economic concerns that surround forest fire mitigation in Canadian forests. Natural Resources Canada currently promotes a change in approach towards forest management that more fully considers the beneficial ecological role of fire in forests, and that sustains the entire forest ecosystem, rather than particular, economically-valuable species of trees (Hirsch, 2005). For example, the agency highlights research that is being undertaken within the University of Alberta's Sustainable Forest Management Network (SFMN), which in recent years has developed the 'Ecosystem Management by Emulating Natural Disturbance' (EMEND) project. This project has influenced commercial logging patterns in some Canadian forests. According to Natural Resources Canada's website,

> Forest companies are already putting into practice lessons learned from EMEND. In addition to cutting trees in a physical pattern similar to that left behind by a typical forest fire, harvesters leave clumps of trees in place for wildlife habitat and seed regeneration. Organic material is also left, to allow nutrients to return to the soil. (Natural Resources Canada, 2007)

Prescribed fire is frequently employed within national parks, and is perceived by federal forest agencies to be a cost-efficient and ecologically beneficial strategy. In order to reduce large-scale fire risk, these agencies also advocate the conversion of more flammable conifer forests to deciduous species which are less likely to burn (Hirsch, 2005; Natural Resources Canada, 2007).

The Okanagan Mountain Park fire was one of several natural disasters in Canada that provided the stimulus for the development of a new Canadian Wildland Fire Strategy (CWFS) in 2005. The CWFS aims to implement a comprehensive and standardized approach to forest fire mitigation and forest fuel management within WUI regions across

the country. Emphasizing the benefits of an inclusive, participatory approach among communities, the private sector and governments, the CWFS employs recommendations that include more extensive public education and the promotion and implementation of *FireSmart* strategies for mitigation on individual properties (to be described more fully below), as well as a broader implementation of prescribed fire initiatives on public forested lands (Born et al., 2007). As described by Born et al. (2007, 9-10):

> [The CWFS] will facilitate the setting and implementation of policies that are integrated and accounted for within comprehensive forest and land management plans seeking to balance the social, ecological, and economic aspects of sustainable forest management....Fire exclusion policies, heavily influenced by the European views of the past, will give way to an era of well-conceived wildland fire management in which policies reflect an understanding and acceptance of fire as maintaining Canada's healthy and diverse ecosystems....The effectiveness of fire suppression will increase when it is used in combination with proactive mitigation strategies such as fuels management.

1.3.4 Forest Fire Mitigation Recommendations for British Columbia since the 2003 Fire

Concerns about the risk of large-scale forest fires to forested communities across British Columbia existed prior to the 2003 Okanagan Mountain Park fire. In 2001, the Auditor General of British Columbia released a report that examined the degree to which various levels of government in British Columbia were able to mitigate the risk of large-scale fires in WUI communities across the province. The report suggested that there was an insufficient level of awareness of fire risks among WUI governments and residents, and concluded that a greater degree of preparation was required among WUI communities to reduce the potential for future large and damaging fires (British Columbia Office of the Auditor General, 2001).

As a result of the 2003 forest fire, several documents have proven influential in the revision of forest fire mitigation policies at the provincial, regional and municipal levels in and around Kelowna. Three of the more pivotal documents, *Firestorm 2003: Provincial Review*, the Kelowna municipal *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* and *FireSmart: Protecting Your Community from Wildfire*, make recommendations to reduce the build-up of combustible fuels within forests through the strategic implementation of prescribed burns, mechanical thinning of forests, and the replacement of flammable vegetation types with more fire-resistant species.

The provincial government in British Columbia initiated the *Firestorm 2003: Provincial Review* in the wake of the 2003 wildfires, in an effort to investigate the concerns of a variety of stakeholders and to make recommendations regarding such issues as forest management and emergency response. The report is the result of several stakeholder and public meetings across the province, in which input was received from members of government agencies at the federal, provincial and municipal levels, fire departments, community and environmental organizations, professional forestry agencies, as well as the citizens of areas of the province affected by wildfire. Key recommendations from the report include the establishment of pilot projects to '...demonstrate and prove the social, economic, and ecological costs and benefits of fuel treatments...' in WUI areas; increased application of prescribed burning in provincial forests; the modification of restrictions to selective tree harvesting in provincial parks (i.e. the Class 'A' designation in provincial parks); and adjustments to forest harvesting practices and policy that would allow for 'on-site removal or burning of spacing slash' as well as incentives for the removal of a greater proportion of flammable tree species

regardless of their commercial value (Filmon, 2004, 28-9). Upon release of the report in 2004, the Liberal provincial government responded positively to all of the fire mitigation measures that were recommended (Freake and Plant, 2004).

FireSmart: Protecting Your Community from Wildfire was created by *Partners in Protection*, a group which describes itself as an "...Alberta-based coalition of professionals representing national, provincial, and municipal associations and government agencies responsible for emergency services, land-use planning, and forest/park management and research" (Partners in Protection, 2007a). The document is directed at individual efforts towards fire mitigation, and includes recommendations to modify vegetation within 'Priority zones' within a 30 metre radius around the home for the purpose of significantly reducing fire risk. In Priority zone 1 (within 10 metres of a building), recommendations include thinning of densely treed areas and the removal of older/dead and dry vegetation, in favour of mowed lawns and the conversion of vegetation to 'low-fuel-volume plants' (Partners in Protection, 2007b, Ch. 3-7)

In 2006, the Municipality of Kelowna commissioned an independent review of existing land use planning policies within the city, entitled *Review of Policies, Procedures and Bylaws Relating to Wildland Fire*. Many of the fire mitigation proposals in the report addressed issues regarding the adjustment of building practices and removal of vegetation on residential properties. In early 2007, Kelowna city council voted to implement several of the report's recommendations, which included: the recommendation that new homes be constructed under 'requirements that are more restrictive than the B.C. Building Code' (e.g. by employing fire retardant roofing materials); the creation of fuel breaks surrounding new subdivisions in the form of perimeter roads; an assessment of the

vulnerability of forested ecosystems within municipal boundaries, that would influence the modification of fuel treatment strategies to reflect ecological concerns; and the 'enhancement' of public education programs about fire risk and prevention (City of Kelowna, Director of Planning and Development Services, 2006). Other recommendations in the report, such as incentives for residents to thin fuels on publicly owned land adjacent to their properties, and the requirement that developers construct new homes at a minimum of 10 metres from a forest interface area, were delayed by council until a period in which future 'budget and staff resources' would be sufficient to implement and monitor these measures (City of Kelowna, 2007).

Reactions to forest fire mitigation strategies have varied among other stakeholders in the province. Since 2005, professional foresters and the forest practices board in British Columbia have come forward on several occasions to express concerns about current wildfire risk, resulting in part from what they argue has been an insufficient degree of implementation of the *FireStorm* report recommendations for forest fuels management (Palmer, 2007). The Association of B.C. Forest Professionals (2005) has advocated for greater funding and public education, as well as more aggressive action towards the removal of excess forest fuels than was recommended in the *FireStorm* report. Stressing the benefits of prescribed fire in forests surrounding Kelowna to address what they consider to be hazardous levels of fuel buildup, at the same time the group has acknowledged the complex nature of the present condition: "It's too much to collect, and people squawk [about smoke] if you burn. Even Kelowna today has the same forest conditions on its west side that it had on its south side in 2003" ("A New Kind", 2007, 6). The recurrence of damaging forest fires in the general Kelowna area in 2009, this

time within areas north and west of the city, have, unfortunately, highlighted the significance of these concerns.

Naturalist groups in the province as well as other residents with environmental concerns have stressed their preference for ecologically sustainable forest management over aggressive fuels management within the province's forests. This concern applies particularly to protected, class 'A' parks such as Okanagan Mountain Provincial Park and Myra-Bellevue Provincial Park, within which modifications to vegetation have historically been significantly restricted. Tensions have arisen between these groups and other residents of the province who link the class 'A' designation to greater fire risk, and who claim that the restriction of fuel thinning and controlled burns and accumulation of standing dead trees has "...ultimately led to the development of unhealthy forests" (Filmon, 2004: 29-30; B.A. Blackwell & Associates, 2007; John Woodsworth cited in Government of British Columbia, 2003; Milton Wilson cited in Government of British Columbia, 2003). This conflict demonstrates how differing interpretations of aspects of forest management such as forest health among community residents may influence their varied responses to fire mitigation policies in the region.

1.4 Current Approaches to Disaster Mitigation among Forest and Fire Management Agencies in and around Kelowna

1.4.1 British Columbia Ministry of Forests and Range

As mentioned earlier, the B.C. Ministry of Forests is responsible for the management of crown forests that surround Kelowna. The Ministry has also worked with the Kelowna fire department on joint forest fuel management initiatives within the city (R. Blanleil,

personal communication, December 12, 2008). In a 2003 report addressed to the *Firestorm 2003: Provincial Review* committee, the B.C. Ministry of Forests described attempts at active implementation of forest fire education and mitigation strategies across the province over a fifteen-year period prior to the Okanagan Mountain Park fire; many measures were not fully implemented, due in part to the Ministry's concerns about uncertain costs as well as the potential for negative reactions from Kelowna residents (B.C. Ministry of Forests and Range, 2003; Duncan, 2003; Filmon, 2004). As was noted in the report, "Proposals to deal with potentially dangerous fuel conditions through controlled burns and limited action wildfires were regularly met with public resistance due to smoke and visual impact concerns" (B.C. Ministry of Forests and Range, 2003, 8). As a result, the Ministry contended that "...much of the province's interior remains in a fuelled-up condition and the risk of future wildfires is high" (Filmon, 2004, 25). During this period the Ministry also identified among residents of many B.C. communities a substantial lack of awareness of and commitment to *FireSmart* strategies to mitigate fire risks on their own individual properties in the years before the fire (B.C. Ministry of Forests and Range, 2003).

Following the Okanagan Mountain Park fire, the Ministry suggested that the effectiveness of its revised mitigation strategy (which includes the use of forest thinning and prescribed fire) could potentially be reduced due to the fact that it would most likely be required to take place "...far enough away from homes that people don't notice it" (Freake and Plant, 2004, 233). In order to address residents' concerns about fire mitigation practices, a more aggressive campaign within communities to promote the

findings of the *FireStorm* report has been recommended by the Ministry (B.C. Ministry of Forests and Range, 2003).

1.4.2 British Columbia Parks

B.C. Parks manages forests in the provincial parks surrounding Kelowna. B.C. Parks forestry officials work with the Ministry of Forests to implement a forest fire mitigation strategy that, as emphasized on the agency's website, prioritizes public safety. As a result, fires in provincial parks are frequently suppressed, though some fires that occur in more remote areas are allowed to burn under monitored conditions (British Columbia Ministry of Environment, 2009).

Since 2003, increased fuel management work involving tree thinning and prescribed burning has taken place in provincial parks and protected areas, spurred in part by pine beetle concerns (British Columbia Ministry of Environment, 2009; Filmon, 2004; Hoekstra, 2007; M. Ladd, personal communication, August 15, 2008). Prescribed fire is employed in areas of least risk to community residents, property, or the health of local ecosystems; this method is favoured because "... it is cost effective, covers a large area in a short time, and leaves a naturally complex forest matrix as a result of skips and areas of high and low intensity burns" (British Columbia Ministry of Environment, 2009). Mechanical tree thinning is employed in areas where it is deemed that prescribed fire cannot be safely used. Within areas of forest in relative proximity to development which would benefit from controlled burns, aggressive tree removal is first undertaken to reduce the risks of prescribed fire. Forestry officials with B.C. Parks have been careful to distinguish selective tree removal from commercial logging, which is prohibited in

provincial parks. As they explain, "Tree removals differ from commercial logging in that they are planned to achieve defined conservation or health and safety objectives and they are conducted with a much higher level of ecological sensitivity – revenue generation is not an objective of tree removal projects" (Ibid). The agency has also stressed that any revenue gained from the sale of thinned trees is put towards the costs of forest fuels management and site restoration in provincial parks (Ibid).

The ecological benefits of fire-maintained ecosystems (for example, the provision of wildlife habitats in fire-maintained grasslands versus dense forests, and the prevention of disease and insect attack as part of a 'more diverse habitat structure') have been presented as a 'secondary goal' of B.C. Parks' fire management strategy (Ibid). The Parks Area Supervisor for B.C. Parks has described how the 2003 fire helped in part to restore former grasslands that were in abundance within portions of Okanagan Mountain Provincial Park prior to human influence in the area. The benefits of this type of grassland ecosystem to the restoration of wildlife habitat (e.g. Bighorn Sheep) was cited by the official as an important reason to implement increased prescribed burning strategies within the park (M. Ladd, personal communication, August 15, 2008).

Recent revisions to B.C. Parks' forest management policy will allow for increased resources to be devoted to tree removal and controlled burning efforts. The agency is also in the process of developing Fire Management Plans for the province's parks which will define more extensive future fire mitigation plans (British Columbia Ministry of Environment, 2009).

1.4.3 Regional District of Central Okanagan

The Regional District of Central Okanagan (RDCO) manages forests in regional parks within and surrounding Kelowna, including Bertram Creek Regional Park, which was impacted by the Okanagan Mountain Park fire. In recent years, the RDCO has implemented several fuel management projects within regional parks, employing both mechanical thinning and prescribed fire (M. Kopp, personal communication, December 16, 2008). The use of prescribed burning under controlled and somewhat restricted conditions (due to the fact that regional parks are often surrounded by urban development) is advocated by RDCO's Parks Services Manager due to the perceived ecological benefits of controlled burns. A prescribed burn was implemented in Kalamoir Regional Park (located on the west side of Lake Okanagan) in 2005 in collaboration with the Ministry of Forests and Range. This project, which was described by the Parks Services Manager as 'extremely successful' (Ibid), will be described in more detail in the *Results* section of this report.

The District office is currently overseeing the development of a formalized region-wide strategy for forest fuels management within regional parks, set for completion in 2009 (Ibid). As part of this strategy, ecosystem health as well as fire mitigation will be addressed; for example, one consultant involved in the project has advocated for the reduction of excess vegetative growth in order to reduce general forest vulnerability to drought, insect infestation and disease. Specific fire mitigation recommendations include the increased use of prescribed fire; the creation of more extensive fuel breaks within strategic areas of forest that are adjacent to communities; and the alteration of forest species compositions (B.A. Blackwell & Associates, 2007).

The RDCO, with funding from the B.C. government, is also currently taking active part in the development of community wildfire preparedness plans for the entire central Okanagan region (not just within regional parks), also scheduled for completion in 2009. The priority for this project is the identification of populated areas most vulnerable to significant impact from forest fires (M. Kopp, personal communication, December 16, 2008). One potential result of this process could allow for the City of Kelowna and Regional District of Central Okanagan to actively participate in fuel reduction efforts within crown lands along a two-kilometer zone just outside of the Kelowna municipal boundary, the area officially under the jurisdiction of the Province of B.C.. This move is strongly supported by the Parks Services Manager for the Regional District, who has expressed concern that in previous years the province may have been managing the area according to other priorities:

> ...[the province] would probably be managing, I'm guessing, in terms of maximizing fibre production coming off of the forest for forest licensees, etc., etc....they've also got environmental values they're managing for too. Threats to the urban area, I don't think would be the highest priority of the province, ahead of those resource management issues. (Ibid)

Over the past several years, the RDCO has focused aggressive fuel reduction efforts on areas that were experiencing intensive pine beetle infestation, in an effort to reduce risks to forests of both future fires and widespread beetle attack (Regional District of Central Okanagan, 2007). However, it has been suggested by the Parks Services Manager that previous mitigation strategies involving aggressive tree removal in beetle-infected areas may have had limited effectiveness. The Region is now investigating mitigation practices that would focus mainly on the management of parks once an infestation has already moved through a forested area. This type of approach would take

into consideration methods to manage the large amounts of combustible forest fuel (i.e. dead trees) that would result from infestation, while addressing species habitats requirements as well as other aspects of the rehabilitation of each area back to its former ecological regime (B.A. Blackwell & Associates, 2007; M. Kopp, personal communication, December 16, 2008). Concern has been expressed by the Parks Services Manager about the lasting effects of aggressive fire mitigation efforts on local forest health:

> It almost feels like our hands are being forced right now by this epidemic of pine beetle that's coming in…I think we're playing a little bit with science here, and I'm not sure that we're following a well-mapped-out course….It feels to me like a bit of a high-risk gamble. You're damned if you do and you're damned if you don't… (M. Kopp, personal communication, December 16, 2008)

Addressing residents' concerns about the pine beetle has become an increasingly significant component of public education about fire mitigation in the region. The RDCO informs community residents about its approaches to forest fire mitigation through community meetings and open houses. These events are advertised through the RDCO website as well as local media, and are communicated to various 'Friends of' parks groups in the region. Through this process residents are often informed of, rather than participate in, the development of fire mitigation strategies, though as the Parks Services Manager has clarified, "I think if we had significant concerns raised by any member of the public or any constituent group around our proposed approach …then we'd have some consideration, and try to determine whether or not we can alleviate those concerns or not, but we wouldn't ignore it" (Ibid).

1.4.4 City of Kelowna:

The City of Kelowna manages forests within the urban boundary. Actions taken to mitigate the risk of forest fires within the municipality were significantly expanded in the late 1990s, as a result of a fire that occurred on Knox Mountain on the city's northern edge in 1998 (I. Wilson, personal communication, August 8, 2008). Historically, fire mitigation measures within the city's forests have faced varied reactions from members of municipal council due to concerns about the costs associated with the removal of excess vegetation from urban forests, as well as health and safety concerns raised by residents surrounding the potential generation of smoke from proposed prescribed burning projects (B.A. Blackwell & Associates, 2006). After the 2003 Okanagan Mountain Park fire, a more comprehensive and formalized fuel reduction plan was established for the city's forests. The implementation of this plan has been described by Kelowna's Urban Forestry Supervisor as an evolving process, made more complex by continual forest regrowth and densification within these areas (I. Wilson, personal communication, August 8, 2008).

Currently, the areas in which tree removal is now most strongly focused are those that have suffered significant pine beetle infestation; this process is expected to intensify due to increasing infestation of the pine beetle and the potential for up to 80% of pine in the area to be destroyed as a result. Mechanical thinning and pruning is the main strategy employed in city-owned parks and public spaces to remove trees in more densely forested areas. Most trees that are cut are mechanically chipped and spread on site, and a small proportion of logs are sold (with any funds received directed to future municipal fuels management efforts) (I. Wilson, personal communication, August 8, 2008).

Members of the Kelowna Fire Department participate with city staff in public education programs about forest fire mitigation. Workshops and open houses are advertised to the general public on the city's main website, and the city's fire department works directly with residents of interface neighbourhoods at most risk of property damage from forest fires. Municipal officials involved with fire mitigation have also responded directly to fire mitigation concerns expressed by some neighbourhood associations. According to the city's Fire Chief, the distribution of the *FireSmart* manual, in order to promote mitigation actions for the benefit of the whole community in addition to individual properties, is a key component of these meetings (R. Blanleil, personal communication, December 12, 2008).

Chapter 2: Theoretical Framework

Having established the contextual background that determines the differing nature and disaster mitigation perspectives among Kelowna residents and forestry officials, Chapter 2 provides an overview of the study's conceptual framework. Section 2.1 explores the work of disaster theorists and researchers who have identified social, political and economic influences on the vulnerability of urban residents to hazard risk. The increased degree of choice available to many North American populations regarding settlement in ecologically volatile locations (in comparison to other regions of the world) is emphasized, to create links with the motivations of Kelowna residents who purposefully establish livelihoods within a wildland-urban interface community that continues to be vulnerable to disaster.

In Section 2.2, the concepts of social nature and social constructions of nature are explored, in order to examine how societies (particularly those within urban environments) perceive their relation either within or separate from nature, and to investigate the ways in which nature is defined and perceived by these societies (influenced by factors such as explorations at various spatial and temporal scales). These ideas are brought forth to emphasize the legitimacy of a range of interpretations of nature beyond so-called 'expert' discourses. In this section, the three predominant perspectives of nature that will be explored among Kelowna residents are also introduced: 'forest as hazard', 'forest as aesthetically valuable', and 'forest as inherently valuable'. Section 2.3 provides avenues through which inclusive and participatory approaches to public

education and mitigation strategy development within forested communities may incorporate these nature perspectives.

2.1 The Political Ecology of Hazard: Social Vulnerability to Natural Disturbance

Since the last decades of the Twentieth Century, researchers and theorists within the field of disaster studies have critically exposed connections that exist between social vulnerability and exposure to increased risk from natural disturbance. More often than not, economically and politically vulnerable populations in the Developing World have historically been the focus of this type of analysis. The concept of 'marginalization' is usually explored as part of these assessments, and is described by Pelling (2001, 179) as "...the exclusion of certain individuals and groups from economic, social, or political resources, [which] shapes who in society is vulnerable to risk and whether risk turns into disaster." Disaster theorists have argued that less powerful social and economic groups are made more vulnerable to natural disturbance either because they are likely to have access only to settlements that are within ecologically volatile locations, or as a result of insufficient access to the types of resources and information that would increase their resilience to natural disaster events (Hewitt, 1983; Blaikie and Brookfield, 1987; Wisner et al., 2004).

Disaster theorists have also implied that by contrast, North American populations, due to increased social and economic opportunities, are able to take a more active role in choosing the degree of vulnerability to natural disturbance to which they are exposed (Cronon, 1996; Davis, 1999; Wisner et al., 2004). Though this assumption has been challenged by some North American scholars [see Collins' (2008) study of lower income

groups' exposure to forest fire risk in the White Mountains of Arizona; Cigler's (1996) examination of the experience of the elderly and poor during the 1993 Midwestern flood; and Masozera et al.'s (2007) study of differential vulnerability to Hurricane Katrina], exposure to disaster among residents of many urban regions of North America is frequently the result of their desire to live close to volatile natural environments. In many forested communities, for example, populations have expanded greatly due to the appeal of living within scenic locations; these areas often have accordingly higher property values due to their pleasing visual attributes, yet have considerably more exposure to the potential risk of property damage from forest fires (Cortner et al., 1990; Dombeck et al., 2004; Winter and Fried, 2000).

There are several ways in which exposure to disaster risk among urban populations in North America has been influenced by institutional structures and policies. For example, disaster mitigation strategies over much of the last century that placed emphasis on 'technocratic', engineering solutions to overcome long-standing patterns of natural disturbance have encouraged development in areas known for their ecological volatility (Cigler, 1996; Etkin and Stefanovic, 2005; Pelling, 2001). Wolch (2007, 374) suggests that modernist approaches to flood control in North America during this period (in the form of dams and levees) were symbolic of society's perceived dominance over and separation from nature, and resulted in "...a landscape rooted in worries about the destructive power of the natural world and the need to control it via massive engineering works and technological feats." As a result of these types of engineering measures, high-density, large-scale developments continue to be established within many flood-prone areas of the United States (Cigler, 1996). Resistance to natural disturbance in forested

places over this period has taken the form of decades of fire suppression, which is now believed to have ultimately intensified community exposure to forest fire risk (Arno and Allison-Bunnel, 2002; Born et al., 2007; Hirsch, 2005).

Community settlement within ecologically-volatile areas is also facilitated through the provision of institutional safety nets such as property insurance (made available to those residents who can afford it) and government disaster relief programs (Collins, 2008). In these cases, residents may prioritize private property rights over potential disaster risk, as local ecologies are manipulated to suit settlement interests under the assumption that homes can be replaced in the event of disaster (Collins, 2005; Etkin and Stefanovic, 2005; McKee et al., 2004).

The more thorough examination of social vulnerability to disaster that has occurred over the last few decades has influenced a reassessment of the drawbacks to technological fixes and institutional structures in mitigating hazard. The dangers inherent in trying to resist natural disturbances through large-scale engineering projects have been made evident in past structural failures that have increased the vulnerability of neighbouring populations to natural hazards (Pelling, 2001); one notable example is the failure of the levee system in New Orleans as a result of Hurricane Katrina. Prolonged periods of fire suppression have been implicated in the occurrence of large-scale and damaging wildfires near populated areas, including fire events that have occurred in recent years near California's shrubland regions (Syphard et al., 2007).

Technological approaches have also been critiqued for their restrictive nature. Pelling (2001) suggests that technological approaches are predominantly exclusionary as they are created within the domain of the scientific world, and maintained by private

sector and political interests with limited public consultation. He attributes a relative lack of support for postmodern approaches to disaster mitigation (as described more fully below) to lobbying by private interests for the continued proliferation of highly profitable technocratic solutions.

The last few decades have witnessed a change in approach to disaster mitigation that addresses changing attitudes about societal responsibilities to surrounding ecologies. As part of this effort hazards researchers promote mitigation strategies that would result in the creation of settlements away from more ecologically sensitive areas (Burby, 1998; Cigler, 1996; Dombeck et al., 2004). La Point (2007) proposes that greater connections be established between urban populations and their surrounding ecologies in order to more fully explore the potential of established ecosystem processes in increasing resilience to disturbance events. Etkin and Stefanovic (2005, 477) question the moral justification of settling within areas known to be at risk of flooding (complete with infrastructure designed to resist rather than adapt to watershed processes):

> ...moving beyond narrow, egoistic, anthropogenic perspectives opens up different possibilities for mitigation activities. That means that even if a municipality is legally empowered to develop in flood plains, and even if an insurance policy is put into place to compensate potential victims, we must continue to ask questions such as: what kind of compensation are we extending to ecosystems and other non-living victims of disastrous planning? And what kind of imbalances are we creating by refusing to find a proper eco-ethical 'fit' between our human actions and the needs and constraints of the natural world?

The same moral lens might just as readily be applied to other vulnerable developments (such as settlements on mountain slopes, fault lines, beach front, or the wildland-urban interface).

2.2 Social Nature/Social Constructions of Nature

New approaches to examining society-nature relations have developed to resist notions of societal control over nature that have often resulted in more technocratic solutions to the perceived risks of the natural environment. The 'social nature' concept acknowledges society's inevitable influence on and interrelationship with other elements of the natural world (i.e. non-human populations), in contrast to the 'nature-culture dualism' that is often perpetuated in modern Western society (Castree, 2001; Castree and Braun, 1998; Braun, 2002). As Castree (2001, 3) explains, both historically and increasingly today 'nature' has been:

> ...defined, delimited, and even physically reconstituted by different societies, often in order to serve specific, and usually dominant, social interests. In other words, the social and the natural are seen to intertwine in ways that make their separation – in either thought or practice – impossible.

Braun (2002, 13) suggests that the idea of social nature challenges assumptions that 'true' nature can only exist within increasingly diminishing areas of untouched 'wilderness'; this new perspective then "...allows us to see modified landscapes – cities, farms, parks, second-growth forests – as worthy of as much, or even more, attention from environmentalists as 'wild' areas." Through this view human populations are considered as relevant and important aspects of natural systems; to ignore this relationship is to ignore both the crucial challenges that currently exist as a result of excessive human impacts (e.g. climate change), as well as the capacity of human populations to contribute to the overall well-being of (and within) surrounding ecosystems.

Within the social nature concept, urban areas are not only significant sources of many current ecological concerns, but also hold the potential for the realization of

practical, effective and far-reaching forms of environmental action. Heynen et al. (2006, 4) caution against a perspective in which "[the] city is…posited as the antithesis of nature, the organic is pitted against the artificial, and, in the process, a normative ideal is inscribed in the moral order of nature." Within urban environmental policy over the last half of the Twentieth Century in Canada, Tyler (2000) identifies how predominant sustainable development discourses have evolved over this period from one in which land is evaluated according to its usefulness for specifically human purposes to a contemporary ecological approach that recognizes the benefits and requirements of the entire ecosystem, not just of the humans who inhabit these spaces. Harvey (1996, 186) suggests that urban ecological systems are inevitably intertwined with social and economic processes, and describes New York City as a 'created ecosystem' in order to illustrate his point, stating: "…it is particularly odd to find many otherwise dedicated ecological thinkers excluding the massive transformations of urbanization from their purview while insisting in principle that in an ecological world everything relates to everything else." As a result, Harvey cautions against overly-aggressive programs to return existing urban physical, social and economic processes to some idealized natural state, recognizing that any attempts to modify present conditions (that result from past human influences) have substantial impacts on the current populations (both human and non-human) that exist within them.

As part of this effort, social nature theorists have explored the ways in which differing (and sometimes conflicting) interpretations of ecological events, and the generation of solutions to ecological challenges, can reflect particular political agendas or expressions of power (Braun, 2002; Harvey, 1996; Keil, 2003). Post-structuralist

concepts maintain that the world is 'ordered' and realities expressed through discourse, and that dominant discourses within any society exert power through their influence on perceptions of and actions towards nature. Through this perspective the material existence of nature itself is not being denied, however, doubt is cast on sole reliance on 'expert' or absolute definitions of what nature is or how ecological concerns should be addressed; the methods by which societies may interact with and attempt to preserve non-human environments may have many possibilities (Castree, 2005; Castree and Braun, 1998; Escobar, 1996).

For example, Demeritt (1998) suggests that the ways in which nature is perceived can be significantly influenced by the particular spatial scale at which scientific knowledge is generated. These perceptions, in turn, can have powerful effects on the methods by which governments, environmental agencies and others define environmental problems and propose solutions. Exploring the differing forest conservation strategies that stem from scientific approaches such as silviculture (individual species examinations) and ecology (large-scale examinations of species interrelationships), Demeritt (1998, 182) asserts:

> These differences are consequential, but they cannot be explained in terms of the (un)truth of silvicultural representation of the forest. They are the products of practice, not representation. The issue is not whether one better reflects the underlying nature of the forest but how this nature is figured and realized and with what effects.

Hull et al. (2000) suggest that attempts to define the 'natural' state of a particular ecosystem based on measurements of perceived absolute qualities of ecosystem health can be problematised, resulting from the fact that ecosystems can be defined within

varying boundaries of time and geographical space; depending upon which conceptualization is employed, the health of varying combinations of species and ecosystem structures could be affected. They also maintain that, due to the fact that environments can exist in the form of any among several potential natural states at any one time (resulting from a variety of human- or non-human-based influences), there is no one 'best' approach through which these environments should be restored. Within this view, what constitutes the 'natural' state of any environment exists within a continual state of change.

Recommended strategies for fire mitigation in British Columbia's forests that have been developed in the years since the 2003 Okanagan Mountain Park fire have no doubt been assembled as a result of a complex process of negotiation between various political, social, economic and ecological interests. Though there may be controversial aspects to the methods by which these recommendations have been developed within government and forestry agencies (e.g., dissenting voices silenced, decisions made for reasons other than forest protection or fire mitigation), this research does not seek to apply a political ecology-inspired approach to critically reviewing hegemonic influences on how interpretations of ecological value and forest fire risk were imposed (on receiving populations) as a part of this process. For the purposes of this research, these strategies simply represent the mainstream formulation of what currently constitutes ecologically sustainable forest fire mitigation policy in this context. Rather, this research draws from political ecology/poststructural theories in an attempt: to gain a greater understanding of the particular social constructions of nature that exist among community members who have willingly chosen to live in an area that is vulnerable to natural disturbance, and who

consciously accept or reject these mainstream disaster mitigation recommendations based on their own interpretations of nature and hazard; and to examine how social constructions of nature among WUI populations guide their actions and their potential influences on policies based on ideas of ecological sustainability and/or community safety from natural disturbance.

To this end, this research is guided by concepts from Castree's (2005) evaluation of the ways in which nature is often interpreted and valued among populations within a modern Western context. Castree contends that the natural world cannot be experienced in any form (whether among 'expert' or general populations) that is free of bias or interpretation. The ways in which nature is perceived are "...multiple in their origins, their meanings, their referents and their audiences. Together, they materially shape understandings of, attitudes towards, and practices upon those numerous things we describe as natural things" (Castree, 2005, 18). Castree (Ibid, 17) identifies three general 'knowledges' of nature:

> *Cognitive knowledges* make claims about what is (and is not) natural; they seek to describe and explain those things we call 'nature'. *Moral* (or *ethical*) knowledges...entail value judgments about the propriety of what is (and, again, is not) done to those things we consider to be natural. Finally, *aesthetic knowledges* seek to instruct us on what is beautiful, uplifting or otherwise pleasurable about what we call 'nature'. Aesthetic knowledges are less about what is 'good', 'right' and 'just'...and more about what is edifying and sensually satisfying.

This research draws on literature that demonstrates several ways in which nature is interpreted within a contemporary North American urban context: as *volatile* – a force to be controlled; as *aesthetically valuable* – a contribution to the character of one's

surroundings and subsequent sense of place; and as *inherently valuable* – a distinct entity to be preserved and protected for its own sake.

2.2.1 The 'Nature as Hazard' Perspective

As mentioned earlier, flood mitigation policy over the last century in North America has often taken the form of engineering approaches to controlling what are perceived as volatile natural forces, in order to ensure the safety of surrounding urban settlements (Burby, 1998; Cigler, 1996). Support for these technical approaches has been associated with the general public's trust in what are perceived to be 'expert' solutions (Morris-Oswald, 2005). Over the same period of time, forest fire mitigation policies that emphasize fire suppression have provided communities with a measure of perceived control over damaging natural forces (Arno and Allison-Bunnell, 2002; Busenberg, 2004; Dale, 2006).

Impressions of fire hazard have influenced reactions to particular fire mitigation methods. The comparatively recent shift in North American forest management policy from complete fire suppression to the implementation of controlled burns in some forested areas, with a goal of emulating natural disturbance, has faced significant resistance from WUI residents. Concerns about safety during implementation of prescribed burns stem from what is perceived by residents to be a risky and potentially uncontrollable approach (Shindler, 2007; Winter and Fried, 2000).

The sense of fire threat in WUI communities can sometimes appear so large that residents feel overwhelmed; this may reduce the motivation of residents to undertake smaller mitigation efforts on their own properties. In Winter and Fried's (2000) study

involving Michigan WUI homeowners, participants described how they had witnessed the ineffectiveness of particular fire management measures on private properties in a previous fire (e.g. buffer zones that failed in preventing the spread of fire to neighbouring buildings). As a result, participants linked personal inaction on fire mitigation to a lack of faith in these measures.

However, the experience of disaster can also diminish WUI residents' awareness of potential future fire hazards. A comparison of attitudes between WUI communities that have been affected by fire, versus those that have not experienced large fire events, demonstrates that residents of communities that have already experienced a fire disturbance may be less concerned about future risks (Cortner et al., 1990); according to Cortner et al. (Ibid, 59) this demonstrates residents' "...lack of knowledge about the recurring nature of wildland fires..." The very recent reoccurrence of widespread forest fires near to Kelowna in July 2009 directly illustrates how this assumption of reduced risk may well be false.

2.2.2 The 'Nature as Aesthetically Valuable' Perspective

The aesthetic valuation of nature is sometimes based on the perceived commodity potential of certain 'natural' environments to create tourism opportunities or to raise property values (Wolch, 2007). Keil and Graham (1998) examine the influence of real estate media that sells images of nature settings among the wetlands of the Oak Ridges Moraine (located north of Toronto) to potential homebuyers, while homebuilders simultaneously disrupt large portions of this environment in order to make room for expanding residential settlements. As Collins describes in a 2008 study of households in

the White Mountains of Arizona, developers as well as upper-income individuals establish vacation properties within forested areas due to their visual appeal, despite the fact that these properties are particularly vulnerable to forest fire hazards. Rapid and extensive urban development into forested areas, fuelled by the desire of new residents to live within forested settings, can be the largest factor complicating ecologically sustainable practices of fire mitigation (Dombeck et al, 2004).

Swart et al. (2001, 233) draw links between an aesthetic valuation of nature and the popularity of outdoor recreation, and identify the ways in which certain "[landscapes] are preferred because they represent such valuable things as culture or the historical identity of a group." Emotional ties to particular landscapes have contributed in part to conflicts surrounding the restoration of urban ecologies. Helford (2000) describes how the Chicago Wilderness restoration project, an effort aimed at converting wooded areas surrounding Chicago to their former prairie condition (similar to that seen before the arrival of European settlers to the area), has been strongly opposed by critics who would prefer to maintain these areas in their current wooded state. While restorationists have presented burned and thinned forests as spaces for the regeneration of the landscape in ways that mimic historical conditions, many local residents perceive these areas as sites of damage and ruin, which have restricted community members from experiencing the area's former cherished forests.

Contemporary hazards literature contains other examples of the ways in which an appreciation of nature in urban environments is linked to residents' sense of place and self-identity. In interviews with residents of Charleston, North Carolina following Hurricane Hugo, Hull IV et al. (1994) found that among other aspects of the urban

landscape such as homes, historic churches and public buildings, elements of the urban forest were most commonly mentioned as 'icons of special significance' in the community that were lost to the storm. Etkin and Stefanovic (2005) suggest that an attachment to place among community members affected by floods, aided by the provision of insurance and disaster aid, can often contribute to 'reconstructing vulnerability' during the rebuilding process, by reducing the motivations of residents to change their land use patterns in ways that would more fully acknowledge underlying ecosystem vulnerabilities (Etkin and Stefanovic, 2005, 477). Residents may also prioritize perceived private property rights (which would allow them to manipulate their natural surroundings according to personal aesthetic preferences) over community disaster mitigation efforts or the conservation of urban ecologies (Cigler, 1996, Collins, 2008; Etkin and Stefanovic, 2005; La Point, 2007).

Studies of fire mitigation activity among WUI residents have revealed a frequent preference for maintaining the aesthetic qualities of house and landscaping at the expense of increased safety from forest fires (Collins, 2005; Daniel et al., 2003; Winter and Fried, 2000). In a 2005 study of rates of adherence to *FireSmart* recommendations by Edmonton residents in the wildland-urban interface, McGee found that removal of trees and other vegetation on individual properties with the purpose of reducing fire risk was the least likely measure to be implemented. This result contrasts with earlier studies cited by McGee, in which residents in these other study areas frequently removed excess vegetation (see McGee and Russell, 2003; Nelson et al., 2004). As these other studies involved surveys of owners of relatively larger properties, McGee attributes this increased willingness to remove trees and shrubs to the fact that the respondents in these

cases had sufficient space to both reduce the risk of fire in outer areas while maintaining some of the forested character on other parts of their properties. McGee's 2005 study also revealed that fire safety was not always the primary motive for the implementation of fire mitigation activity on homeowners' landscaping. For example, mowing grass around the home was the most popular measure to be implemented among surveyed residents, a measure that was also associated with aesthetic benefits and the "...regular maintenance of an urban property" (McGee, 2005, 155), consistent with prevailing social mores.

2.2.3 The 'Nature as Inherently Valuable' Perspective

The role of environmentally minded civic activists in promoting river restoration projects in Los Angeles and Toronto, fuelled by a value system predicated on the concept of 'eco-citizenship', has been explored by Wolch (2007) and Desfor and Keil (2004), respectively. In their study, Desfor and Keil largely credit the implementation of the Don River restoration project in Toronto to the activities of knowledgeable and motivated local citizens on the task force, who "...understood their own identity as being defined by their relationship with nature rather than separating themselves from it" (Desfor and Keil, 2004, 85). As a member of the environmental organization involved with the Los Angeles river restoration project, Wolch advocates for the prioritization of ecologically-sustainable community policy over the maintenance of individual property rights, as well as the "...development of a 'green consciousness' that is apt to pit individuals against dominant political-economic structures and institutions predicated on constant growth and accumulation" (Wolch, 2007, 379).

Conflicts have arisen between disaster mitigation agencies and residents who prioritize the inherent value of forests. Prather et al. (2008) document the substantial division that exists between officials involved with forest thinning and environmentalists who work to conserve the habitat of the Mexican spotted owl in the southwestern U.S.. The large degree of opposition to the *Healthy Forest Initiative* (put forth by the United States government in 2002, and which proposed to significantly increase timber cutting in federally owned forests with the purpose of reducing wildfire threat), is another recent example of the potential for controversy that exists due to widely differing forest management perspectives between government officials and citizen groups. Recommendations for aggressive tree thinning within publicly-owned forests have frequently been linked by environmentalists to logging strategies motivated primarily by commercial opportunities rather than community safety or forest health (Dellasala et al., 2004; Dombeck et al., 2004; Kauffman, 2004; Reinhardt et al., 2008).

Concerns about maintaining healthy forests may influence support or rejection of mitigation actions at the individual level. Nelson et al. (2005) reveal a range of motivations behind the choices for landscaping among residents of WUI areas in Minnesota and Florida that are particularly at risk of forest fires. While most respondents had removed at least some vegetation around their homes, at the same time they often noted that they managed their properties for 'naturalness' (particularly within deeply wooded areas). This perceived 'naturalness' was expressed by most homeowners as resulting from limited human impact, for example in refraining from clearing vegetation, as "...they liked the natural look...the habitat, the feeling it gave them, or the good they perceived a natural landscape has for the environment" (Nelson et al., 2005, 331).

2.3 Approaches to Forest Fire Mitigation Policy: Inclusive and Participatory Strategies for Living with Nature and Risk at the Wildland-Urban Interface

The development of informed and effective strategies towards disaster mitigation and the management of so-called 'natural' spaces benefits from the contributions of a range of stakeholders. Community participation in these efforts has the potential to generate additional knowledge and perspectives that may not have been considered within expert discourses, facilitate the effective and efficient implementation of strategies resulting from this approach, and allow for input from a range of social and cultural groups that may previously not have been heard (Corburn, 2003; Heiman, 1997).

An important element of a participatory process for forest maintenance and fire mitigation is the awareness of the subjective character of the many nature perspectives that may exist across a community (Castree and Braun, 1998; Castree, 2005). Castree (2005) outlines paths towards greater understandings of differing knowledges of nature, which include a continual process of evidence-gathering, the maintenance of a reflexive approach to research methods and purposes, and an openness to reassessing commonly-held assumptions about the natural world as new perspectives are broadened. Social scientists have identified several opportunities to incorporate the varied perspectives of WUI residents into disaster mitigation strategies that more fully inform community members about the risks and benefits of forest modification, build trust between residents and forestry agencies, and provide an effective framework for collaborative methods of mitigation strategy development within populated wildland-urban interface areas.

2.3.1 Incorporating Community Nature Perspectives into Public Education Programs for Disaster Mitigation

Public information-sharing initiatives for forest fire mitigation have the potential to address many of the priorities and concerns of WUI residents. Cortner et al. (1990, 58) advocate for meaningful public education strategies that enhance residents' awareness of fire risk, as "...those with more knowledge [are] more willing to tolerate more liberal fire policies." These programs would balance information about the necessity for fire in forest ecosystems with cautions about the hazards of living in WUI communities. Forest fire mitigation researchers have also advocated for public information efforts to specifically address "...misperceptions about the fire hazard and the efficacy of specific strategies designed to counter it" (Winter and Fried, 2000, 47; Shindler, 2007). For example, Miller and Wade (2003) stress the importance of education in reducing the controversy that is frequently associated with the implementation of prescribed burns in community settings in the southern United States.

As forest management strategies are often planned and communicated at a scale much larger than the immediate context to which residents can easily relate, Shindler (2007, 41) suggests that education programs should therefore address community members' particular physical and social contexts by "...helping residents understand how potential impacts will affect personal property, local economies, and valued places..." Shindler and others also suggest that communication with residents about forest fire mitigation can be made more effective when the benefits of particular mitigation practices other than fire prevention are emphasized (Ibid; Cohen and Saveland, 1997; McGee, 2005). Nelson et al. (2005, 333) contend that homeowners at the wildland-urban

interface could be encouraged to manage their properties for forest fire mitigation "...if the correct incentives are in place or they can find activities that do not conflict with their values." This argument is based on the authors' observation that participants in their study who cleared portions of their properties of vegetation did so for reasons other than forest fire mitigation (e.g. to improve the perceived aesthetic appeal of their properties or to reduce insect accumulations).

2.3.2 Encouraging Participatory Approaches to the Development or Modification of Fire Mitigation Strategies through Increased Communication and Trust-Building between Forestry Agencies and Community Residents

A large portion of the contemporary North American hazards literature explores ways in which societies can actively participate in community disaster mitigation, through democratic processes of knowledge-gathering (Burby, 1998; Cigler, 1996; Dombeck et al., 2004; Etkin and Stefanovic, 2005). The challenge is to develop strategies for the management of so-called 'natural' spaces in and around urban areas that will be sensitive to a variety of community interests and concerns (Braun, 2002; Heynan et al., 2006; Keil, 2003). For example, Campanella (2007) examines how the discourse of reconstruction that was initiated among New Orleans planners and residents shortly after Hurricane Katrina was affected by a range of cultural and ecological influences and implications. Proposals for the urban rebuilding process ranged from the complete re-creation of the city as it was in order to maintain its cultural heritage, to the relocation of the whole of New Orleans to a less ecologically-volatile environment.

Perceptions among forest managers and community residents regarding the 'natural' states of surrounding environments (for example, ideas concerning ideal

densities of forest cover) can vary significantly (Shindler, 2007). Trust-building between residents and managers is an essential element in reducing forest management conflicts. Helford (2000) presents the Chicago Wilderness restoration project as a case in which opposing views regarding the best approach to preserving urban ecology have erupted in part into a disagreement over (and contest around) which group cares more about the protection of local natural areas. Helford describes how critics of the project questioned the scientific authority employed by restorationists, particularly in light of a perceived 'manipulation' of science to suit changes to restoration policies and practices based on evolving fieldwork results. Within this heated atmosphere, seemingly objective public education programs were also implicated as tools to foster restorationists' political motives. Residents who opposed these restoration practices asserted that only those members of the community who regularly used these areas should have a voice in the process of maintaining them (i.e., they attempted to privilege the legitimacy of certain residents over others). For their part, their reliance on the unquestioned authority of scientific knowledge regarding appropriate restoration strategies was demonstrated by restoration groups' inability "...to understand how anyone faced with the 'evidence' could not see the natural world as they do" (Helford, 2000, 121).

Goldstein's (2007) study of the clash between a group of community residents and forest management agencies in the aftermath of a severe wildfire in San Diego in 2003 demonstrates the potential for lack of trust due to widely differing sustainability and disaster management perspectives. In this case, residents' proposals to modify fire mitigation strategies (through methods to return the area to 'pre-settlement conditions' that they viewed as appropriate to improving forest health) were viewed by forest

management agencies as contrary to long-established approaches of forest modification and fuel reduction that were aimed at reducing the threats to community safety posed by neighbouring forests. Resistance among residents towards resource management agencies' arguments for pursuing this type of forest management strategy resulted in part from residents' perceptions that "...scientific evidence functions as a post-hoc rationale for pre-existing policy" (Ibid, 242). In these types of cases, it appears crucial that the legitimacy of all knowledges presented as part of the development of forest management and fire mitigation approaches be considered by all parties involved.

Kenny (2003, 786) recognizes another challenge that exists in communicating between various stakeholders (e.g. between community groups and municipal planning departments) in the formulation of urban forestry policy in Canada: that of balancing the goals of public and private land holders:

> Considering the degree of fragmentation of ownership in the urban forest, sustaining benefits to the community as a whole while recognizing private property rights will continue to challenge planners, managers, and elected representatives. An informed and motivated community will be essential to any effective urban forestry program.

Thus, community participation is considered central to the development of fire mitigation efforts that will potentially address the many (and potentially conflicting) perspectives that exist among WUI populations.

However, conflicts between different forest management interests may not always be as large as originally perceived. For example, Prather et al. (2008) examine the potential to resolve established conflicts between forestry officials who implement fuel reduction strategies in the ponderosa pine forests of the southwestern United States, and conservationists who are working to preserve the habitat of the Mexican spotted owl

(which has thrived in the increasingly dense forests that have resulted from prolonged fire suppression in the area). A more extensive, landscape-level analysis of the area undertaken by the researchers reveals some possibilities for the co-existence of both of these goals; they suggest that more intensive forest thinning could take place within areas of less sensitive owl habitat, particularly within developed areas, while allowing some dense patches of rural forest in other, more remote areas, to remain. Prather et al. also suggest linkages between vegetative thinning and the ultimate preservation of the spotted owl, as mitigation efforts could potentially reduce the risk of large-scale, stand-replacing fires that would drastically reduce owl habitat within area forests.

As part of these types of efforts, communication between forestry officials and community residents is key; Hull and Robertson (2000, 98) advocate for a pluralistic strategy that would assist community members in determining their own definitions of what constitutes 'naturalness' within a particular environment, within an atmosphere that, "...facilitate[s] negotiation of ecological restoration goals that are socially acceptable, ecologically meaningful, and managerially relevant." Shindler (2007, 45) proposes that this can be encouraged through participatory projects with the community that include residents in 'field tours' of the areas to be managed:

> In these settings, people can actively engage one another to talk through their concerns, actually walk the particular landscape to be treated, examine the risks and consequences of various choices, and work out acceptable strategies to unique local problems—all with the likelihood that greater trust will be built among those involved.

Within these contexts, Shindler also suggests that residents be informed that fuel management is a process that is not always certain, and that procedures may need to be modified as work evolves. Due in part to the somewhat uncertain effects of past and

future human impacts on surrounding environments, the restoration and maintenance of natural environments can be approached through a process of adaptive management that consists of 'well-intentioned and systematic trial and error' (Hull and Robertson, 2000, 112).

Chapter 3: Methodology

Section 3.1 provides an overview of the methodology employed in this study, which consists of a discursive analysis of the various nature perspectives displayed through in-depth interviews with Kelowna residents, an exploration of residents' views expressed in literature about the 2003 fire and its aftermath, and an examination of photos provided by some of the interviewees. A description is also provided of how this methodology can facilitate a deeper understanding of some of the views held by community residents. This section also provides a reflection on the responsibilities towards and effects of the researcher on study participants during the course of the research process. Section 3.2 provides a detailed explanation of the research methods employed and subjects included as part of this study, including descriptions of the demographic makeup and process of interviewing Kelowna area residents, the measures employed to analyze photos provided by some of the interviewees, and the range of written texts that were examined. Also included is an exploration of the potential limitations of this research approach, as well as the ways in which I attempted to overcome them.

3.1 The Study of Conceptions of Nature and Hazard: A Poststructural Approach to Analysis

In order to undertake an extensive and sensitive exploration of the ways in which interpretations placed upon urban forests have translated into acceptance or rejection of forest fire mitigation policies in Kelowna, I have chosen a poststructural approach to analysis. This approach "...celebrates the 'humanness' of the research process in its

inevitable subjectivity" (Hoggart et al., 2002, 223), and considers the wide range of views expressed by study participants, rather than searching for a single truth.

My work was inspired by Castree's attempts "...to reveal the 'symptomatic silences' that lie within any given claim about what nature is, how it works, what it does and how it should be treated" (Castree, 2005, 27). As a result, the study employed both visual and discursive qualitative methods. Specifically, I conducted a comprehensive survey of provincial and municipal documents, scholarly literature and popular press around the 2003 fires. I also collected primary data, consisting of in-depth and semi-structured interviews with Kelowna area residents, and analyzed photographic images that were taken by some of the interview participants.

3.1.1 Exploring Social Constructions of Nature through a Discursive Analysis of Text and Images

Social constructions of nature as expressed by residents in and around Kelowna were explored through the methodology of Foucauldian discourse analysis (developed by the French philosopher Michel Foucault), in an attempt to

> ...identify and to understand how particular [discourses] are privileged as 'truth'. According to Foucault, this requires careful investigation of discursive structures. These are the unwritten conventions that operate to produce some kind of authoritative account of the world, be it the physical environment, an economic process, or social difference. (Waitt, 2005, 168)

Rose (2001, 136) describes discourse as "...a particular knowledge about the world which shapes how the world is understood and how things are done in it"; this approach to analysis acknowledges the existence of multiple, sometimes competing discourses, originating from such factors as "...claims to truth, or to scientific certainty, or to the natural way of things" (Ibid, 154). Similarly, Waitt (2005) contends that the influence of

a particular discourse can be measured by the degree to which perceived 'truths' become established and ultimately converted into regularly practiced forms of action within a society. The most powerful discourses become established as 'normal' or 'common-sense' (Ibid, 165), effectively establishing boundaries around what may be perceived as constituting acceptable thought or behaviour within 'the particular culture, time, and place in which they are produced' (Ibid, 172).

Hajer (2006) also suggests that concepts are influenced by the spatial and historical contexts of social interactions. A particular discourse gains prominence when it is established as part of the 'institutions and organizational practices' of a social group (Ibid, 70), and if it is commonly employed and acted on by a significant proportion of any given population. Like Rose, Hajer also maintains that several discourses surrounding an issue can co-exist and often compete, in a variety of forms that may all have some claim to validity. This multiplicity of views does not take away from the material reality of the issue itself; for example, in the case of the varied discourses surrounding the potentially damaging effects of acid rain on forests, Hajer explains (Ibid, 66),

> The point…is not that dead trees as such are a social construct – it is how one *makes sense* of dead trees. In this respect there are many possible (political) realities; one may see dead trees as the product of 'natural stress' caused by drought, cold, or wind, or one may see them as victims of 'pollution'. Pollution can then be seen as an ordering concept, a 'way of seeing', a way of interpreting a given phenomenon.

Lastly, Shurmer-Smith (2002) maintains that discourses are not fixed in position, but instead respond to changing social influences. According to Shurmer-Smith, the researcher needs to look beyond the most prominent or powerful discourses to explore

the variegated meanings that are formed across particular populations, including those minority perspectives that are most often and most easily dismissed.

The analysis of written or spoken language involves a process of careful reading with the purpose of identifying subtle and repeated themes that emerge within a particular discourse, as well as the societal influences on their production. The themes that are discovered become the starting point for a deeper and more detailed level of study of perspectives within the material as part of an 'iterative process' between the sources and the researcher's insights (Crang, 1997). According to Crang, this method of exploration, at times forming a curved rather than straight path to inquiry, is a necessary process that "...in the end becomes one way of justifying your conclusions..." (Ibid, 223), and helps the researcher to more firmly grasp and explain his or her epistemology, described as the process by which 'you can claim to know something' (Ibid, 225). Crang asserts the potential for a variety of perspectives and approaches resulting from this process, as with discourse analysis, "...different researchers will perhaps be asking very different questions of the same types of sources" (Ibid, 219). Therefore, this type of analysis is undertaken with the realization that the researcher's own claims to understanding are one amongst several influences to which interpretation is subject. Rose (2001, 160) notes: "This modesty is what discourse analysis substitutes for more conventional notions of reflexivity."

This study employed discourse analysis to examine both public documents as well as interview transcripts (generated from interviews with government officials and Kelowna residents), in order to explore the ways in which residents' personal interpretations of urban nature connect to larger discursive themes of sustainability and

hazard (a detailed description of the research methods employed in this study will follow in Section 3.2). For example, forest fire can be interpreted from within a range of views – as an extremely damaging force to lives and property, as a vital factor in maintaining ecosystem health, or possibly both – depending on the worldview through which fires are understood and the subject position of the interviewee. This research aimed to uncover the discourses through which Kelowna residents place meaning on urban forests and forest fires, as well as the ways in which individuals make choices based upon these social constructions of nature.

In order to enrich a knowledge of Kelowna area residents' perceptions gained vis-à-vis interviews, this study also applied a discursive analysis to the reading of images of forested areas in and around Kelowna that were photographed by some of the interviewees. Goin (2001) has argued that social scientists should engage in more thoughtful and sensitive analysis of the photographs that are employed within their research documents. What is assumed to be a medium for the transmission of objective, factual information, by simply documenting persons, places or events, ignores the fact that images are framed in particular ways to emphasize specific ideas. Visual images convey messages that may be intentional or unconscious, and potentially reveal levels of meaning within a particular discourse that are not accessible through written or spoken forms of communication (Braun, 2002; Rose, 2001).

Rose (2008) describes the methods used by geographers who have employed the research technique of providing participants with cameras so that they may document their own impressions of a particular issue, referred to by such terms as the 'photovoice', 'photo-elicitation', or 'diary-photography' method (see Beilin, 2005; Latham, 2003;

Latham and McCormack, 2007; McIntyre, 2003). Researchers employing this approach commonly note that proper preparation is essential; this includes establishing rapport with participants prior to camera distribution, and giving clear instruction to participants regarding their role in the project and the purpose of this research approach.

Garrod (2008) calls attention to the participatory nature of what he terms 'volunteer-employed photography'. He contends that the VEP method promotes a deeper level of reflection on the part of participants, due to the additional effort required in the composition of images. Garrod describes the process as "...fundamentally reflexive, encouraging participants to consider their views and experiences in depth, and enabling them to express feelings and ideas they would find hard to verbalize..." (Ibid, 381). However, he also suggests that the larger effort in time required by participants to complete this portion of the study may influence the demographic that is willing to participate (for example, in some cases a significant proportion of senior citizen participation).

3.1.2 Ethics and the Influence of Feminist Approaches to Critical Research: Considerations of Positionality, Reflexivity, and Power Relations

A poststructural approach to analysis involves the continual questioning of notions of objectivity; this includes an attempt to acknowledge the bias and positionality of the researcher, despite the fact that "[these] epistemological skeletons are not necessarily explicit or even internally consistent" (Hoggart et al., 2002, 249). This research sought to achieve transparency by making visible (as much as possible) the ways in which I chose to select participants, interact with them, and interpret their responses. Transparency, in turn, required a reflexive approach of continual learning and critical self-evaluation,

including ongoing reflection on the ways in which my own worldview and value system may have influenced my research. This 'critical reflexivity' is described by Dowling (2005, 27) as the "...self-conscious scrutiny of yourself and the social nature of the research." An important question to be asked during this process is "...are you presenting what you heard and saw, or what you expected to hear and see?" (Ibid, 25). During the course of research, I was also aware that I was bringing to the discussion my own biases within the language I used with participants when referring to concepts of 'nature' and 'ecological sustainability'. While I may not have necessarily identified with all positions that were brought forth within the range of issues that were discussed, my aim as part of this research endeavour was to sensitively and respectfully give voice to all points of view.

Crang (1997) calls attention to the influence of the researcher on the research process, by advising that the attitudes and responses experienced by the person conducting a study be documented and incorporated into the analysis of his or her work. To aid in this reflexive approach, I followed Dowling's (2005, 22) suggestion that researchers maintain a 'research diary' that "...contains your thoughts and ideas about the research process, its social context, and your role in it." In order to work towards a greater level of accountability throughout the process of assembling my research, I also maintained ongoing communication with participants through e-mail and standard mail so that I could answer their questions, receive photographs that were provided by participants, provide participants with progress updates, and distribute a draft version of the written research report for their review and feedback.

The ways in which I obtained feedback from participants in this study were also influenced by feminist theories that acknowledge the varied power relations that exist between the researcher (myself) and the individuals with whom I was speaking. This involved resisting the common tendency of researchers to view participants as 'others', and required the establishment of relationships of mutual respect and trust between myself and the study participants with whom I was speaking. The balance of power can often shift between researcher and researched depending on the differing contexts within which research progresses. For example, as Hoggart et al. (2002, 233) assert, "...[researchers] can be powerless in the face of elites, strongly bonded groups or participants who do not accept their definition of a research situation." Participants are made particularly vulnerable during the research process if statements they have made are not interpreted as originally intended; as Dowling (2005) notes, this vulnerability can be multiplied in cases where policy recommendations are made based on these incorrect assumptions. In addition, as Kobayashi (2001, 66) points out, "...qualitative work inevitably involves interpersonal relationships between the researcher and the subject that may be intensely emotional, although not always in a positive manner."

Prior to the start of the interview portion of my study, I assumed that the potential for risk to participants would most likely stem from emotional distress that could result from discussing uncomfortable memories of loss from the fire, as well as safety concerns with regard to prescribed burning projects and the vulnerability of the community to future forest fires. As I spoke with residents, I made it clear to them that the interview could be stopped at any time, and that they did not have to answer certain questions if they began to feel uncomfortable. Interestingly, although a few participants did become

emotional during our discussions, all wanted to continue speaking about their experiences with the fire.

3.2 Research Method

3.2.1 Analysis of Documents Pertaining to the Fire and its Aftermath

As mentioned earlier, the initial portion of this research project involved a discursive analysis of written texts (published after August 2003) that documented the reactions of community members to forest fire mitigation and urban forest management within and surrounding the City of Kelowna. The documents consisted of media accounts from newspapers and magazines, television, and Internet sources (at the local, provincial and national level); transcripts from the public meetings that formed an initial part of the *Firestorm 2003 Provincial Review*; transcripts from Kelowna municipal council meetings; results of the survey of Kelowna residents contained within the *Review of Policies, Procedures and Bylaws Relating to Wildland Fire*; documented interviews contained within a commemorative book about community residents' immediate reactions to the fire, entitled *Stories from the FireStorm*; and other documents pertaining to this issue (e.g., press releases) that were released by the province of British Columbia.

Vivid descriptions of residents' experiences during and immediately after the 2003 fire were contained within interviews in some of these documents, and the surveys and public meeting transcripts provided valuable insight into residents' concerns about potential fire mitigation approaches.

3.2.2 Interviews with Kelowna Residents

My field research in Kelowna (as well as telephone contact in the weeks prior to this visit) was used to enrich a comprehensive survey of the documents identified above, and consisted of semi-structured, in-depth interviews with community residents. These more intensive methods of analysis of residents' views were employed not with the purpose of applying findings across a wider population, but with the intent of providing a greater comprehension of selected "...rationalities, implications and meanings" (Hoggart et al., 2002, 204). My main aim was to undertake a thorough examination of each among the variety of perspectives that existed across this group, in order to better understand *some* of the links that exist between nature perspectives and the actions taken or concerns voiced by residents that live within this forested environment. Interviews provided the opportunity for "...in-depth understanding that is best communicated through detailed examples and rich narratives" (Ibid, 205). Participants were able to expand on ideas in ways that would not normally be available had survey questionnaires been distributed, and I was able to clarify questions during the course of each interview in order to gain a deeper understanding of the issues involved.

For several weeks in early September 2008, I visited the City of Kelowna in order to gather the bulk of the data that would be provided by study participants. During the months leading up to this visit, I also established contact (by telephone and e-mail) with members of provincial, regional and municipal government institutions involved with forestry and fire mitigation strategies. These officials were selected based either on their contact with Kelowna residents and/or on their participation within agencies that are involved in the administration of forest thinning programs in urban or provincial parks. I

spoke with representatives from B.C. Parks and the Regional District of Central Okanagan about the responses by Kelowna residents to practices of forest fuel management in provincial and regional parks (respectively). I also spoke with the Urban Forestry Supervisor and Fire Chief for the City of Kelowna in order to determine how residents have responded to fire mitigation measures within municipal parks and public spaces, as well as to assess residents' reactions to disaster mitigation recommendations for individual residential properties. These key informants were notified that their participation would not be anonymous. All of these officials expressed genuine interest in contributing to a deeper understanding of community residents' perspectives on forests and forest fire mitigation as part of their participation in the study, and provided detailed insights into residents' concerns as well as the successes and drawbacks of previous mitigation practices.

Between the months of April and August 2008, I assembled a group of potential Kelowna resident interviewees from individuals identified through contact with local naturalist groups and neighbourhood organizations, persons identified through media coverage of the 2003 fires, and respondents to several notices that were placed in local newspapers. E-mail contact with neighbourhood and naturalist groups proved to be the most successful means of accessing interested participants, as the first persons I contacted then forwarded my request for participation on to other individuals and organizations, in a snowball effect. Newspaper ads and other media sources yielded three additional responses.

During the period of time I was in Kelowna, I spoke with eleven area residents. Two of the interviewees live in the Village of Westbank, which is situated directly across

Lake Okanagan from Kelowna, and one interviewee lives in the City of Vernon, located approximately 45 kilometres north of Kelowna. The Westbank residents were included in the study because of the close proximity of their homes to the 2003 fire; both interviewees have rather dramatic and extensive views of Okanagan Mountain Park from their properties. The resident from Vernon with whom I spoke lives within the same extensive forested environment that connects with Kelowna's forested landscape, and demonstrated perspectives and concerns that were similar to those of many Kelowna residents. As a nature guide in the area, this resident was also able to provide insights into the perspectives of some Kelowna residents as she has frequent contact with residents who regularly visit the provincial parks that surround the city. Though a significant proportion of interviewees were recruited through their affiliation with naturalist or community groups, all participants presented their nature perspectives and opinions about disaster mitigation as individual views; it became apparent through the interview process that each resident's perspectives reflected a range of influences that may or may not have resulted from their affiliation with these groups.

Participants ranged in age from their early twenties to just over sixty-five. Some of the interviewees were single, some married, and some were also parents of young families. Four of the participants were either approaching or experiencing retirement, and another participant (the youngest) was a university student. All interviewees live in middle- or upper-income neighbourhoods. Many of those interviewed had lived in the Kelowna area for at least twenty years. Others had moved to Kelowna from other areas of the province, because of employment opportunities available in Kelowna or due to the health benefits of living within a dry, temperate climate. One participant had immigrated

with his family to Kelowna from Europe. None of the participants lost their homes to the disaster (I had contacted some of the individuals who had lost homes and were identified in literature about the fire, but did not receive any responses), however one participant lives on the edge of the neighbourhood that experienced the most damage to homes during the 2003 fire. Her home is situated directly across from Okanagan Mountain Park, and suffered damage that included melted windows from the intense heat of the blaze.

The participants were asked to speak about their personal connections to urban forests and concerns about fire safety (see Appendix A). Questions about residents' reactions to recommendations contained within policy documents directed towards provincial, municipal and individual fire mitigation strategies (as described in Section 1.3.4 of this report) also formed a significant part of the interviews. In general, residents were eager to share their stories about their experiences with the 2003 fire as well as their interactions with local forests, and many provided detailed feedback on their opinions about recommended fire mitigation strategies. In most cases, these interviews were conducted within the participants' own homes, which provided the ability for interviewees to describe their perceptions of their surrounding landscape within the immediate context of their own properties. Conducting interviews within participants' own homes also helped to ensure that they felt comfortable and secure while recounting otherwise difficult events.

3.2.3 Photography Exercise

Following the completion of my interview with each resident, I explained the purpose of the photography exercise portion of my study, which as I proposed would involve

participants taking photos of what they considered to be the appealing and unappealing features of the natural environment in and around Kelowna. As described in Section 3.1.1, I informed residents that the purpose of this exercise was to solicit feedback on residents' impressions of their forests that could not be fully expressed in words. Five of the participants agreed to participate in the exercise, and each were given a 24-image disposable camera, a one-page guide on what was requested of the participant (see Appendix B), and a pre-paid mail-back envelope marked with my home address.

Within a 60-day period, four of the participants returned the cameras to me; one resident did not complete the exercise. I then developed and digitized the photos. During this time I also e-mailed all participants to ask if they had any photos that were taken during the 2003 fire and its immediate aftermath that they would be willing to share with me, as I realized during the course of writing the report that these photos would provide an effective complement to residents' spoken descriptions of their direct experiences with the fire. Once participants had e-mailed these additional photos, I began the process of analyzing the images, the results of which are displayed in the *Results* and *Discussion* sections of this report.

The images that were photographed by study participants complemented powerfully their spoken accounts as witnesses to the dramatic effects of the 2003 disturbance and its aftermath, as well as their personal connections with natural areas in and around the city. Images were analyzed according to their effectiveness in conveying personal experiences, perspectives or reactions (for example, the degree to which photos conveyed residents' exposure to the severe fire threat, their emotional attachments to particular landscapes, or their opposition to certain mitigation strategies). Photos also

helped to demonstrate residents' knowledge of ecologically sound or fire-safe management of local ecosystems, or simply to document what the concept of 'naturalness' means to them. Accompanying written comments provided by participants also helped in discerning the points that residents were trying to get across through their images. The composition of the images often reflected the ways in which residents perceived their surrounding landscapes, by such methods as prioritizing immediate versus distant views (or vice versa), or by filling the frame with one significant landscape feature.

The range and quality of photos received demonstrated significant effort on the part of Kelowna area residents to document their personal understandings of nature and hazard. Each of the three predominant nature perspectives explored in this study were reflected in the images provided by participants.

3.2.4 Limitations of the Research Approach

Any project that attempts to employ a self-critical, reflexive effort requires the researcher to seriously assess his or her performance in implementing the planned research approach. One early concern during the initial phase of my research stemmed from the fact that the amount of time I would spend on field research within the City of Kelowna, a total of two weeks, would be relatively limited. I was initially concerned that my ability to establish rapport with participants would be negatively affected. However, it should be noted that these interviews were intended to enliven data from myriad other sources (detailed in Section 3.2.1), so that narratives and photographs could be employed to enrich other text-based analysis.

In order to partially compensate for this reduced level of face-to-face contact, telephone/Internet resources were employed to the maximum benefit, wherever possible, to gain access to potential participants, make initial contact with interviewees, and conduct interviews when required. During this process, I realized that certain visual subtleties that are a part of in-person interviews were not available through these methods. Telephone interviews, however, were employed only when speaking with government officials, and proved to be quite appropriate, as in some cases telephone contact more easily accommodated the schedules of these individuals. Interviews with officials were undertaken with the purpose of supplementing knowledge of community residents' reactions to fire mitigation policy recommendations, information that was gained through in-person interviews with the residents themselves.

A second concern involved the pursuit of my research within an unfamiliar context, having never travelled to Kelowna, or to any of the Western provinces for that matter. I initially suspected that an incomplete knowledge of the area and lack of personal connection to anyone living there, in combination with the fact that I've never experienced first hand the threat of a forest fire to my home, family or livelihood, could potentially impact my ability to establish a certain degree of rapport with local residents. In regard to my unfamiliarity with the area, I discovered that this provided some benefit to the interview process, as with familiarity there is always "...the danger that participants know the researcher's views and values, perhaps tailoring responses accordingly, so potentially robbing the research of dissenting voices" (Hoggart et al., 2002: 234). I also believe there was value in approaching this research endeavour without any connection to what could have been a rather controversial and emotionally-

charged environment. When speaking with residents about the degree to which they were impacted by the fire, I also discovered that I could, in part, empathize with their experiences with disaster, due to my own experience as a child with a tornado that caused significant damage to many homes in my neighbourhood (including my family's home) in the city of Barrie, Ontario in 1985. I believe this personal event allowed me to conduct interviews with greater sensitivity towards the trauma experienced by community residents, and inspired me (by referring to my own experience during interviews) to solicit additional feedback from residents that ultimately provided a deeper understanding of their immediate reactions during the time of the fire.

Lastly, a substantial concern resulted from the relative limitations of the demographic makeup of residents who participated in this study. For example, there were no persons who belong to visible minority groups within the selection of residents who were interviewed. Despite my concern, the lack of non-white participants proved to be somewhat reflective of Kelowna's population in general. Statistical examination of Kelowna's demographics reveals that the number of non-white residents is quite low in comparison to other areas of the province; in fact, the city's culturally homogenous population has for some time been the subject of much critique (Aguiar et al., 2005). For instance, the 2006 census revealed that 3.6% of Kelowna residents were of East and Southeast Asian origin, compared to the 16% that live within all of British Columbia (City of Kelowna Planning and Development Services Department, 2008).

Another demographic limitation stems from the fact that all of the study participants live within mid- to upper-income neighbourhoods, meaning that the perspectives of the significant proportion of residents who hold lower-income

employment within areas such as the agriculture, tourism and service industries were not included in this study. However, it can be noted that one of the primary purposes of this study is to gauge the reactions of residents who own homes in the area, particularly in regard to the measures they have taken on their own properties to mitigate fire risk. Homeowners, especially those who live in close proximity to the community's forested areas, would most likely by definition fall into a more prosperous socio-economic class. Nevertheless, the views of *all* Kelowna residents, including lower-income populations, are important elements in participatory processes for managing forests on public lands in and around the city such as municipal and provincial parks. The exploration of the nature perspectives of residents who live in lower-income neighbourhoods and/or rent their homes therefore represents an important avenue for future research. In a similar vein, although I was open to examining variations in interpretation based on gender, the data set (and the small sample size of participants) did not generate significant insights in this regard. An exploration of gendered differences would certainly form another example of an interesting and relevant line of future inquiry into the influence of nature perspectives on community reactions to forest fire mitigation.

The limitations in recruitment of participants noted above may have restricted the exploration of the full range of community perspectives that exist among Kelowna residents, so crucial to democratic processes of knowledge-gathering and strategy development. However, through the use of several methods by which Kelowna residents' perspectives and reactions were accessed (i.e. by consulting literature that documents residents' reactions to the fire and its aftermath, inquiring with government officials about comments they have received from a variety of members of the community, in

addition to speaking directly with a small group of Kelowna area residents), it is hoped that the goal of this study to better understand most of the differing views held by Kelowna area residents was achieved.

Chapter 4: Results

Having provided the contextual background for this study, an overview of the methodological approach adopted, as well as the conceptual framework within which this work is situated, Chapter 4 presents the results generated by this research. Sections 4.1, 4.2 and 4.3 explore the ways in which residents' reactions to the fire, their impressions of their natural surroundings, and their acceptance or rejection of fire mitigation policy recommendations correspond to three differing nature perspectives ('forest as hazard', 'forest as aesthetically valuable', and 'forest as inherently valuable'). A substantial portion of the results presented in each of these sections detail Kelowna residents' responses to questions that were asked during interviews about several forest fire mitigation recommendations that have been proposed for the city and its forested surroundings, as part of the documents that were introduced in Chapter 1: the *FireSmart* manual (which is directed at mitigation efforts within individual properties), the *Review of Bylaws, Policies and Procedures Relating to Wildland Fire* (which provides recommendations for the city's parks and public spaces), and the *FireStorm 2003: Provincial Review* (which provides mitigation recommendations for provincial parks surrounding Kelowna). The recommendations that were referred to in questions posed to residents are outlined in the sample interview script (see Appendix A).

Section 4.1 links residents' accounts of their emotional responses during and immediately after the Okanagan Mountain Park fire, as well as their current perceptions of forest fire risk, to views of nature that correspond to a 'forest as hazard' perspective. In Section 4.2, residents' descriptions of what they consider to be the appealing and unappealing features of forested areas in and around Kelowna form the basis for an

examination of the 'forest as aesthetically valuable' perspective. Lastly, Section 4.3 outlines residents' concerns regarding the health of local forest ecosystems as part of the 'forest as inherently valuable' perspective.

Section 4.4 presents comments made by forest management officials and community residents that reflect the challenges and opportunities involved in incorporating residents' differing nature perspectives into participatory approaches to forest fire mitigation.

4.1 The 'Forest as Hazard' Perspective

4.1.1 Kelowna Residents' Initial Reactions to the Okanagan Mountain Park Fire, August 2003

In literature documenting the fire and in interviews with study participants, residents often recalled their reactions to severe physical conditions that were generated during the most intense period of the fire, as it progressed first through provincial parks, then into neighbouring developments. The immediacy of sights, sounds and smells of the fire, and resultant ash, smoke and poor air quality were frequently and vividly described by residents (see Figure 4.1). The fire was a disaster so visible for such a large proportion of the general community that at times some residents felt surrounded (WR; WH; Freake and Plant, 2004):

> The smell was acrid, suffocating. You wanted to get away from it. (Linda Andrews cited in Freake and Plant, 2004, 174)

> Driving fifteen kilometers out of town on the Okanagan Connector, you could see black smoke in the distance. It was a beautiful sunny day until then. You descend into it, and you can't see 200 feet in front. It was choking. (Sindi Hawkins cited in Freake and Plant, 2004, 187)

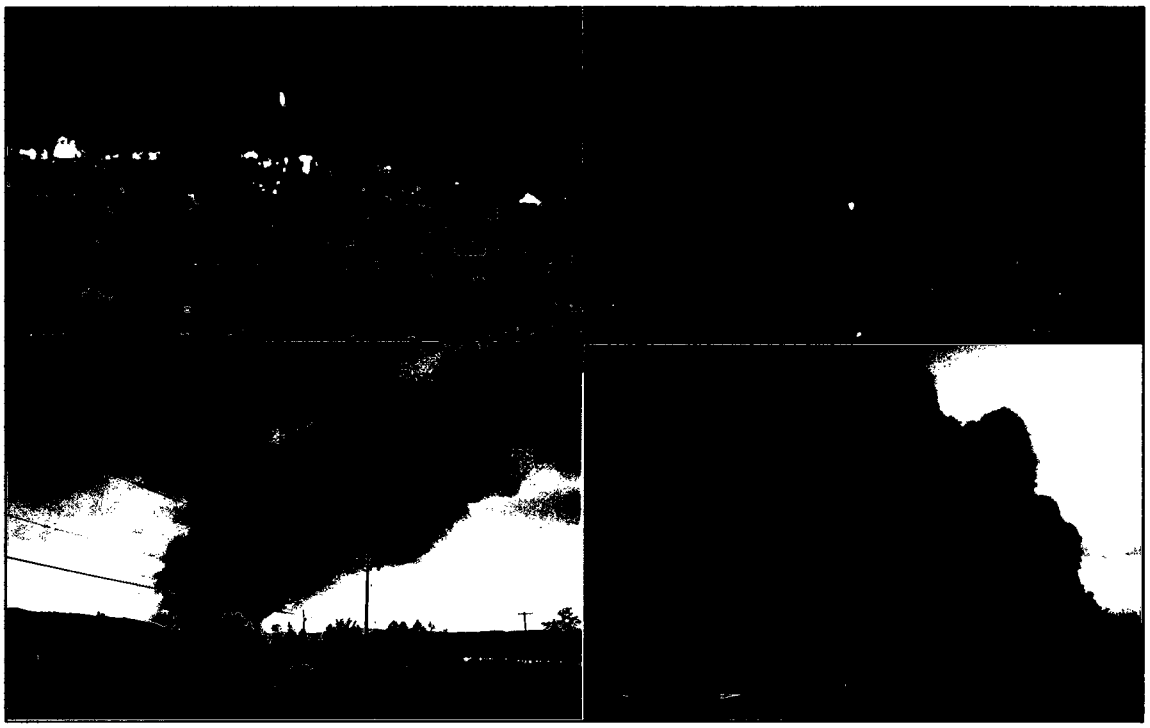

Figure 4.1: Images of the 2003 Okanagan Mountain Park Fire, photographed by interview participants. (a) top left: view across Lake Okanagan of homes burning in Kelowna (WH); (b) top right: night view of the fire (WH); (c) bottom left: view of the fire in the distance (PI); (d) bottom right: image of the fire as the Kettle Valley Railway trestles burned (PI).

Many recalled the panic and disorientation that resulted from the suddenness with which they were required to evacuate their homes (for some, within a period as little as fifteen minutes). During this time, the fire was often experienced as an ominous, rapidly-moving presence that threatened lives as well as residents' personal properties. For one interviewee, the force of the fire was personified; she compared it to "...a hungry monster looking for...its candy..." (RC), that reached out and grabbed houses. Another resident described her experience during the evacuation period:

> I was in a state of shock, I think. I didn't even see the embers all around our neighbourhood. They were telling me, oh yeah, there were big chunks, that were bright, the ones that were fully lit, that were falling around. I didn't even notice that. (SS)

> Flames were jumping down the hill. I felt like it was chasing us. I started to panic because there was a long lineup leaving the subdivision. I was bawling. I thought our house was lost. As we crawled down Casorso Road, I felt trapped. If the traffic took too long, I'd park the car and run. (Naomi Winn cited in Freake and Plant, 2004, 217)

Efforts to stop advancing flames from reaching developed areas of the city were frequently compared by residents to fighting a battle in war, and the extent of destruction compared to that of a war zone (Mervyn Andrews cited in Freake and Plant, 2004, 174; Kevin Brownlee cited in Freake and Plant, 2004, 179; Ofer Barmor cited in Freake and Plant, 2004, 225).

> ...there was one particular day I remember feeling like it was the Second World War....tankers were flying overhead, they were doing pickups from the lake, and it was just, the sound, the sound of that and the smell of smoke in the air, you know, it was a tense time. It really affected everyone that lived here. (WR)

Exposure to this disturbance provoked significant emotional reactions for some residents. One interviewee commented that during this time many residents were 'glued

to the TV all day long' (SS), in order to hear about the experiences of other residents and to receive updated predictions on the path and strength of the fire. Some residents from Kelowna and the neighbouring Village of Westbank who were outside of the immediate path of the fire also experienced panic and fear during this period, due to their exposure to falling ash and poor air quality, as well as their extensive views of forests burning as the fire travelled across the surrounding hills of Okanagan Mountain Park. This sense of vulnerability resulted in part from the belief of some residents that most of the city and other parts of the Okanagan, given the proper weather conditions, could also have been at risk from the fire (SJ). One resident living in the north end of Kelowna recalled: "They were so concerned that once it got into the residential areas, with the natural gas, that it would just fuel itself, from house to house to house...it was just so much out of control...And once it gets that far, who's to say how far it can go?" (DK). One Westbank resident who was interviewed, living in an area across Okanagan Lake from Kelowna and with dramatic and expansive views of Okanagan Mountain Park, recounted how she watched the fire each day from her backyard, at times videotaping homes as they burned:

> I guess we really have a bird's eye view here, exactly where it burned and how it burned. The night that all the homes, the many homes that were lost, I *knew* they were burning because the fireballs would just come out of the home and (pause) you know we knew people were evacuated but (pause) there's animals there and, you know, lives lost. They weren't people, but they were animals. (WR)

Associated with this fearful experience for some interview participants was a sense of awe and respect for the tremendous force of the fire (see Figure 4.2):

> Well, it was scary, but at the same time…it was kind of eye-opening to watch it. You're awe-struck by the power of Mother Nature and the fire itself, the way it moved and the wind shifted and it moved away and came back. The whole community was fighting it. You know, you were kind of awestruck by it. At the same time it was like, yeah, you could have lost your home… (TG)

> I have to say that Mother Nature is quite remarkable. I went over into that property pretty quickly after the fire and had a look, and the ground was burnt, where the roots had gone into the ground there were some holes…so it really took until the winter to put the final end. There was smoke coming up in places." (WH)

The lasting emotional effects of this experience appear to be, understandably, somewhat varied. Residents noted differing reactions among their neighbours, as some decided to sell their properties, while others immediately began to rebuild (Linda Andrews cited in Freake and Plant, 2004, 176). Many who lost their properties recalled how they experienced periods of grief and depression. In removing residents from their homes, whether temporarily or permanently, the fire had removed a primary place of security and memories for some residents (Harrington, 2003; Kennedy, 2003); the loss of this security was frequently compared to mourning the loss of a loved one (Freake and Plant, 2004, 195). Some also described the overwhelming sense of helplessness that resulted from this encounter with disturbance (Ibid, 2004, 93; Sindi Hawkins cited in Freake and Plant, 2004, 187).

Some residents, including those who were evacuated, recalled not being overly conscious of risk before or at times even during the fire event, often due to the trust they held in the expertise of municipal and provincial fire management authorities

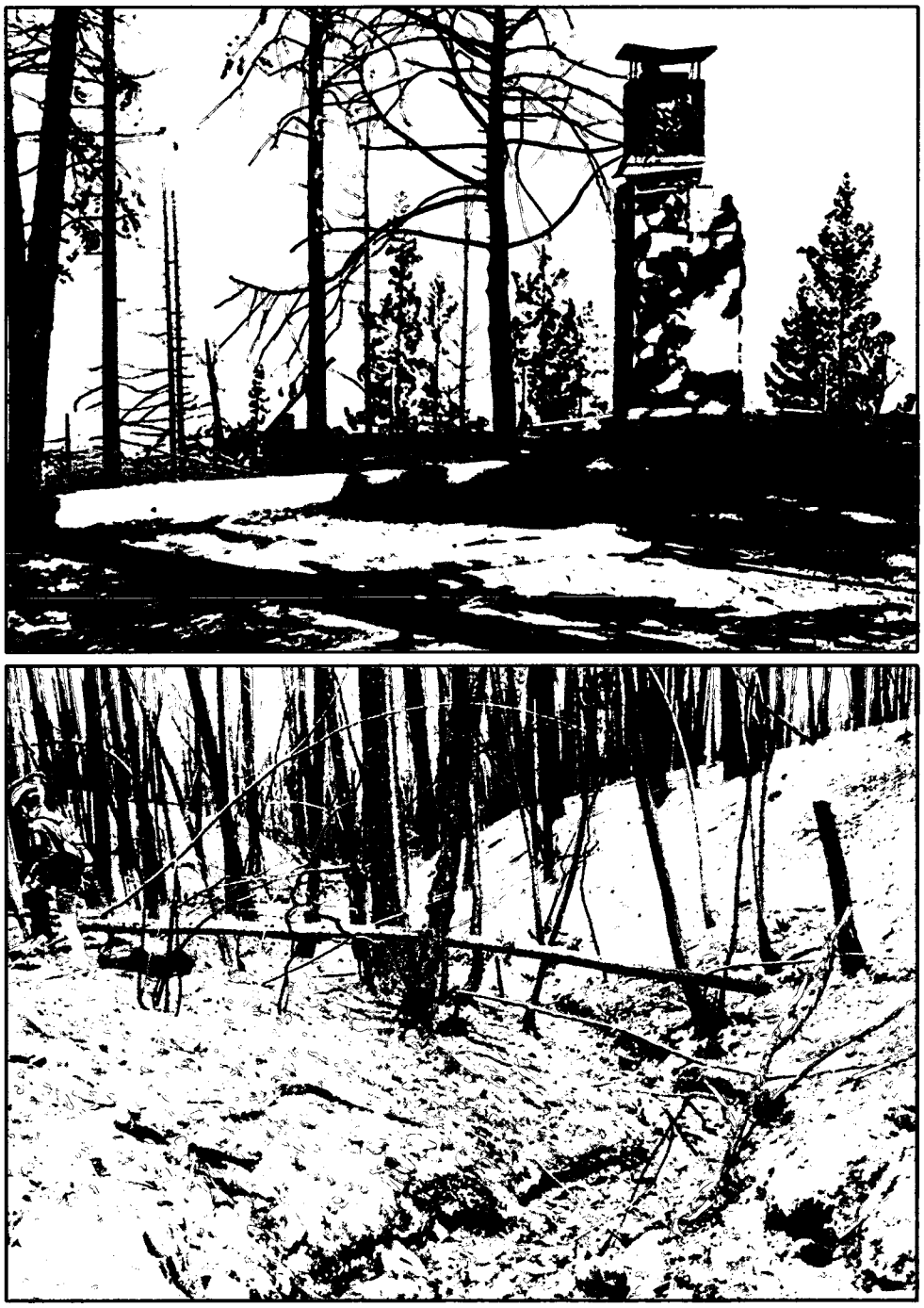

Figure 4.2: Post-fire Images, photographed in 2003 by interview participants: (a) top: photo of burned-out home with chimney remaining (WH); (b) bottom: burned trees and ash in the park (PI)

(Harrington, 2003; SS; SJ; TG). As one resident who lost his home to the fire described, "'I remember laughing, saying 'We have the second largest population in the area outside Vancouver. They're not going to let us burn.'...I thought it couldn't happen to us. The truth is, it can happen to anybody'" (Denis Hostland cited in Natural Resources Canada, 2004). Recounting his impressions within a vulnerable neighbourhood as the fire gained strength, one interviewee described a somewhat surreal experience:

> I remember when the fire started, and it began to move across the hills. I remember sitting out on our deck with my family, literally sitting and watching the fire. And it just seemed (pause) you know, it was kind of like watching TV. You knew it was there, but it just didn't resonate with day-to-day life. So then in the couple of days before we got evacuated, there was ash starting to blow around, so there was literally debris falling out of the sky. The smoke was blocking out the sun, so there was a big red dot up in the sky. But even right up to the day that we were evacuated, it didn't seem like it just happened to, ah, that our house would be one of the areas that had to go....It just seemed so separate from what we were at....I don't think I felt at risk at any point. (CK)

Several interviewees maintained that previous to 2003, they had been conscious of the potential risk of forest fires to their community, either through direct damage to their homes, or through the negative effects of smoke on surrounding air quality. This awareness of risk was often attributed to their knowledge of the dry climate and fire ecology within which the forests surrounding Kelowna exist, described by one interviewee as a 'ticking time bomb' for future forest fires (TR). Despite this risk, many stated that they chose to live within this environment because of their affection for the area and its natural, forested setting. However, some of these residents also expressed their shock about the tremendous size of the Okanagan Mountain Park fire as well as the unanticipated extent of damage that was incurred on surrounding neighbourhoods (ST; DK; PI). Others who were interviewed asserted that the destruction of forests associated

with the 2003 disturbance removed any significant fire risk from their area for the near future. This impression of reduced risk to the community was often associated with residents' faith in lessons learned by fire management agencies as a result of the Okanagan Mountain Park fire (CK; DK; PI; RC; SJ; ST; TG).

4.1.2. Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Hazard' Perspective

As part of *FireSmart* guidelines, residents in wildland-urban interface communities are encouraged to remove or thin flammable vegetation, and convert other vegetation types to more fire-resistant species within a ten-kilometre zone surrounding their properties. Anecdotal evidence cited during interviews with Kelowna's Urban Forestry Supervisor and Fire Chief, in the form of greater volumes of yard waste picked up by municipal waste services in the year immediately following the 2003 fire, suggests that many Kelowna residents were in support of the removal of excess vegetation from their properties in order to reduce future fire risk (I. Wilson, personal communication, August 8, 2008; R. Blanleil, personal communication, December 12, 2008). This degree of participation by residents marked a substantial increase over general community fire mitigation awareness and actions taken prior to the Okanagan Mountain Park fire. However, these officials also noted that, on the fifth anniversary of the fire, interest in and concern over fire mitigation practices appeared to be on the decline.

In a survey of Kelowna residents contained within the municipal *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* report, the majority of those questioned indicated a perceived personal responsibility towards contributing to overall

community safety by implementing fire mitigation practices on their own properties; however, a subsequent assessment of properties by those conducting the survey revealed that in most cases this had not been done (B.A. Blackwell & Associates, 2006). Among residents who were interviewed for this research project, some stated that they had removed vegetation from their properties in support of general efforts to mitigate the risk of forest fire in their community (PI; SS; VR) (see Figure 4.3). Others admitted to not clearing or replacing flammable vegetation on their properties, despite their acknowledgement regarding the fire mitigation benefits of this exercise (WR). This inaction was often associated with residents' stated belief that other areas of the city were more at risk from future fires than their own (DK; TG).

Some residents stated that, as a result of this experience, they became much more aware of the degree of risk involved with living near forested areas (Kevin and Alisa Brownlee cited in Natural Resources Canada, 2004). One interviewee voiced his concern about the effects of large-scale and sprawling development within the forested outskirts of the city, with homes in close proximity to treed areas, on the safety of these neighbourhoods (CK). One Kelowna resident who had previously been against the construction of infrastructure projects that involved the removal of treed portions of residential developments, was now in support of these measures as part of making the community safer, even at the expense of the forest:

> No houses were lost in our neighbourhood. The Gordon Drive road extension stopped the flames because there was no fuel. The extension wasn't supposed to go in for five years and we were so mad when it went in. We don't bitch about the road anymore. (Kim Watt-Senner cited in Freake and Plant, 2004, 186)

Figure 4.3: Photos provided by one interview participant, of neighbour's house (top) and her own house (bottom), with accompanying comments: (a) top: "Pine needles accumulating on eves and roof of house across from Kalamalka Lake Provincial Park. Now that's dumb!" (VR); (b) bottom: "We used the 22 trees taken down for wildfire interface building regulations for our posts. We wanted to keep them with us and are glad we did." (VR)

Residents frequently mentioned an equal or greater concern about the flammability of homes (especially those employing cedar shake roofs) in comparison to the risks of maintaining trees and brush on their properties (Stueck, 2003; TG; WH; WR). One interview participant described a variable pattern of burning that affected homes during the 2003 fire: "The fire would jump a bunch of the regular rooftops [as] it was going for the candy, for the yummy, easy stuff, and not the more difficult stuff to burn." (RC). Another resident who lost his home to the fire reported that, "It's important for people to know that we don't live in the forest...We live half a kilometer away, in a developed community where there are only a few small trees planted along the sidewalks" (Kevin Brownlee cited in Natural Resources Canada, 2004).

The fire was also frequently remembered by interview participants as a volatile force with random, seemingly arbitrary and unpredictable effects, often destroying one structure while leaving other structures that were located right beside them untouched (DK; RC; WH). Some residents recalled extensive damage to surrounding landscaping as homes were left intact (ST; RC), while others suggested that landscaping often fared much better than homes (PI) (see Figure 4.4). As a result, some interviewees suggested that in general, individual actions to mitigate the effects of future forest fires would have limited success against a disturbance the size and intensity of the 2003 fire:

> ...I watched it happen, it's a naturally occurring thing, and you can't mess with Mother Nature, and I know they'll try...but you know if she's ever going to send a fire here she'll win...it's a part of life in B.C., having forest fires. (ST)

> ...once that thing got going there's nothing gonna stop it. I don't, I mean the wind was blowing it....So, yeah I think that buildup is certainly, for the fire to get going the way it got going, was due to buildup. But, once it occurred, did it make any difference? I don't know. (PI)

Figure 4.4: Image of destroyed homes with landscaping left intact, photographed shortly after the 2003 fire by interview participant (PI)

Whether or not they have chosen to adopt *FireSmart* guidelines that address flammable vegetation on their properties, the threat of future disasters similar in scale and intensity to the Okanagan Mountain Park fire has made changes to individual landscaping appear futile to some residents (ST; WR). When speaking about recommendations to remove needles and other vegetative droppings from roofs and surrounding landscaping in order to reduce individual fire risk, one resident responded,

> For the fire to do what it did, it had to have this big furnace area, which is all trees, and hadn't been burnt for a hundred years. That provided the fuel that actually set all these houses and other things on fire, because if you're bombarded, if my house was bombarded with ash for a whole day that's hot, something's gonna burn, it's gotta burn....So there was tremendous heat generated, and it's not this nickel-and-dime stuff around the house that's our problem." (WH)

Several residents agreed with the proposed recommendation contained within the *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* for homeowners to remove a prescribed area of vegetation from neighbouring public forested properties, in order to reduce fire risk to their homes (PI; SJ; TG). Others, though in support of the measure, expressed a preference for municipal action in this regard (RC; WR). One resident voiced his concern that individual residents may not always be fully aware of the most effective approaches to forest fuel thinning, commenting, "You're banking on individuals using the proper procedures....I personally don't know what's considered harmless, and what's considered fuel" (CK).

When asked if any general limits should be imposed on development into forested areas within Kelowna, some interview participants expressed concern about increased fire risk to properties as the result of this type of development expansion (DK; WH).

Concern regarding this issue had also previously been voiced at one of the *FireStorm 2003* public meetings (Milton Wilson cited in Government of British Columbia, 2003).

Many interviewees expressed support for the recommendation that fire breaks be established around new developments in order to increase fire safety, though some of these residents asserted that the recommended width of ten metres would be insufficient to stop a disturbance the size and pattern of the 2003 fire (DK; PI; RC; SJ; SS; TG). A Kelowna developer speaking at a public meeting as part of the *FireStorm 2003 Provincial Review* recounted his observation immediately following the 2003 fire that newer developments in the path of the fire appeared to survive the ordeal more successfully than had older neighbourhoods. He attributed this in part to buffer zones that had been established within landscaped areas that surrounded these newer developments (Graham Wood cited in Government of British Columbia, 2003).

4.1.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Municipal and Regional Parks from the 'Forest as Hazard' Perspective

The *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* commissioned by the City of Kelowna recommended that standards be developed for the management of forest fuels within city parks and other public areas. Kelowna's Urban Forestry Supervisor and Fire Chief have indicated that mechanical tree thinning programs for parks and other forested public spaces, which have been implemented in the years since the 2003 fire, have received positive feedback from many local residents. Some residents have been a part of neighbourhood efforts to clean up local parklands, while others who have not directly participated have sometimes provided landscape workers with snacks

and water out of appreciation for their work (I. Wilson, personal communication, August 8, 2008; R. Blanleil, personal communication, December 12, 2008). However, municipal officials have also noted that initial community interest in and active support for fire mitigation within city forests has now, similar to individual efforts, experienced a gradual decline:

> Before 2003 I would say that there was general support for what we were doing but they were concerned about us not being too aggressive in terms of thinning or reducing forest fuels. After the fire the pendulum swung the other way, and we were getting calls. People almost wanted to have clearcutting around their houses. They were very afraid of the fire hazard, and any kind of trees....it seems that every year that kind of drops off, so every year people are less, you know, I think people think maybe it won't happen again, you know, that there's not such a need for it, or they kind of forget. (I. Wilson, personal communication, August 8, 2008)

Among interviewees, some expressed support for strategic mechanical thinning of vegetation in Kelowna area parks, in order to prevent more vulnerable natural elements in these areas (such as flammable grasses) from igniting into fires that could potentially grow and spread across other areas of the city (DK; PI).

The use of prescribed fire to reduce forest fuels in area parks has garnered varied responses from Kelowna area residents. As mentioned earlier in the *Context* section of this report, forestry staff within the City of Kelowna do not implement controlled burns in city parks or public spaces as part of their forest fire mitigation strategy. According to Kelowna's Urban Forestry Supervisor, this is due in part to negative resident feedback that has been received regarding concerns about the health effects of smoke and the "...real fear of fire in some of these urbanized areas where houses and people are very, very close by..." (I. Wilson, personal communication, August 8, 2008). In contrast, the Parks Services Manager for the Regional District of Central Okanagan (RDCO) noted

that the implementation of a prescribed burn in Kalamoir Regional Park, located on the shore of Lake Okanagan in the Village of Westbank, was a project that was supported by a significant number of local residents. Though he described some initial nervousness on the part of area residents about the project, the Parks Services Manager credited the general success of the effort to a process of consultation about the controlled burning project with a group of local homeowners known as the Friends of Kalamoir Park. However, he noted that there has also existed a small minority of residents that have voiced general concern about potential air quality issues resulting from controlled burning projects (M. Kopp, personal communication, December 16, 2008).

4.1.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and other Forested Areas surrounding the City of Kelowna from the 'Forest as Hazard' Perspective

In the year immediately following the Okanagan Mountain Park fire, some Kelowna residents maintained that suppression efforts at the time should have been undertaken more quickly and aggressively, despite the fire's ignition within the protected area of the park (John Woodworth, cited in Government of British Columbia, 2003). This perspective also took the form of a proposed lawsuit by homeowners against the provincial government shortly after the 2003 fire (Smyth, 2003). One interview participant questioned if increased funds directed towards improved forest fire suppression strategies might be a more practical approach to enhancing community safety, rather than efforts to mitigate fire through forest thinning or controlled burns:

> ...if you go back to those recommendations and say I think we should go back and pull out every third tree – well, number one, it's likely not going to work. Secondly, it's highly costly, highly expensive, how do you pull them out?... Because we're going to continue to have forest, and we're going to have more lineal kilometres encroaching on the forest. In retrospect, if they would have jumped on the fire we wouldn't have had that problem, so maybe instead of the studies and the moneys, let's do some action... (DK)

When asked about their response to selective vegetation removal in provincial parks through mechanical means as recommended in the *FireStorm* report, several residents voiced strong support, citing a perceived effectiveness of this strategy in deterring large-scale wildfires (ST; TG; WR). When describing previous fuel thinning activity that had taken place within parkland close to her property, another resident voiced concern that this type of approach may ultimately have limited effectiveness:

> ...they've gone around and done what they call mitigation work, which is taking out a lot of ground cover and trying to clean it up a bit, which is fine. Because what that does, of course, is prevent a fire that someone happens to start in the area from burning. It's not going to protect you if you have a fire like we had in the area which is crowning from treetop to treetop, long before it ever hits the ground. So, yeah, it works for that kind of stuff. Can you manage for what we had? I don't think so. (PI)

Controlled burning strategies in forests surrounding Kelowna appear to be more controversial. The Parks Area Supervisor for B.C. Parks has noted substantial and enduring health concerns among some Kelowna residents, in particular among the senior citizen population, about the potential for smoke to be generated during controlled burning projects in provincial parks. According to the official, "...[some residents] just absolutely get furious when we try to do any work" (M. Ladd, personal communication, August 15, 2008). Though he acknowledged that some concerns have been addressed through increased communication with residents in the form of targeted open house

meetings, he also maintained that "...there are a number of individuals that we have in those communities that we can't convince..." (Ibid).

Some interview participants voiced either cautious support for controlled burns or rejected the strategy entirely, citing either scepticism about their effectiveness, or concerns that controlled burns could potentially grow out of control (as one resident noted, similar to what had occurred during a prescribed burning project in Yellowstone Park in 1988) (TR; DK).

4.2 The 'Forest as Aesthetically Valuable' Perspective

4.2.1 Residents' Descriptions of the Appealing Features of the Natural Environment in and around Kelowna

Interview participants were asked to describe what to them are the appealing features of the natural environment within and surrounding Kelowna (see Figure 4.5). One resident stated that surrounding vegetation provides her with a measure of privacy surrounding her home (WR). Several residents noted that they value the easy access to nature that is available in Kelowna for outdoor recreational activities such as mountain biking, hiking, horseback riding and skiing. This access was a major factor in drawing some interviewees to the city, as well as in encouraging permanent settlement in the area (DK; PI; RC; WH). For others, the forest environment provides a play space for children, making the area a desirable place to raise a family (ST; TG). One interviewee, whose home was damaged by the fire and who lives on the edge of Okanagan Mountain Park, recounted the experiences of her children within the park prior to the burn: "They would go off and play, and they would take a shovel (laughs) and I wouldn't see them, and then

Figure 4.5: Images of appealing features of Kelowna photographed by one interview participant (with accompanying comments): (a) top: "Lovely playground nestled among trees and rock outcroppings." (TR); (b) bottom: "Nature trail by creek side." (TR)

they'd come back out of the forest when it was getting dark....It was very nice. I'm so glad to have had it while it lasted" (ST).

The expansive views of forested landscape that surround Kelowna are a significant aspect of the appealing character of the area and sense of place for many residents. Interestingly, this connection to place is spatially extensive – often linked to more distant views rather than to residents' immediate surroundings. In many cases, there may be little direct interaction with the forest; residents are able to enjoy forest views while experiencing the comforts and accessibility of an urban lifestyle (CK; SS; TG; WH; WR) (see Figure 4.6). Some also described how the surrounding forested landscape provides a rural aesthetic or 'country feel' within the city, which is associated with a 'natural' look (SS; WR) (see Figure 4.7).

While some interviewees stated that they understand and accept the inevitability of development (citing the growth in population that is fuelled by the appeal of the city's natural surroundings) (DK; JS), other residents voiced concerns about the substantial increase in development that has occurred around the municipal perimeter in recent years, which to them has negatively affected both the size and character of the city, as well as residents' ability to interact with the area's natural features. Development has in some cases reduced the accessibility of existing residents to surrounding parks, as privately-owned new housing and golf courses have now obstructed many traditional forest access points ("Harvard Road", 2005; DK; RC). As one resident described, "...[the forest] gets farther and farther away. We used to be able to go right here to walk our dog, but that's all homes now" (TG). Another resident stated, "I was always climbing up the mountains when I was a kid. It's all about the pine trees and the forest and the lake which is why

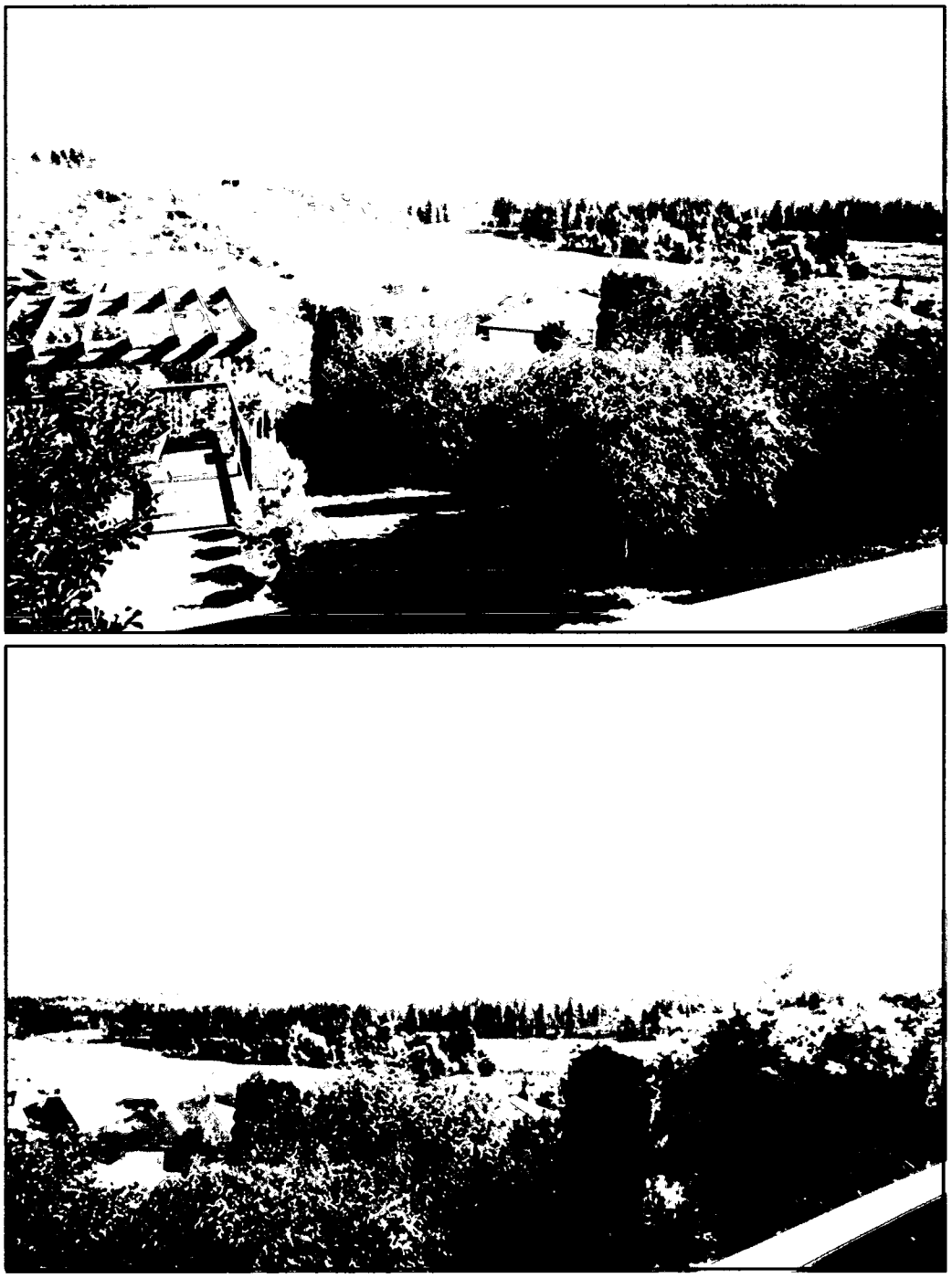

Figure 4.6: Images of appealing features of Kelowna area photographed by one interview participant (with accompanying comments): top and bottom: "Shots of our property – views of the mountain and lake." (WR)

Figure 4.7: Images of appealing features of Kelowna area photographed by one interview participant: (a) (top): "Forest trail near my home. Feels good to get out into the neighbourhood." (VR); (b) (bottom): "Home looking out the kitchen window with the morning sun shining through the leaves with an autumn glow." (VR)

I've liked Kelowna and been here my whole life. And those things are not the same anymore so it's getting easier to say yeah we'll move away" (ST).

Several residents expressed frustration and cynicism against developers who they perceive to be taking advantage of fire damaged forests (RC; ST). One interviewee asserted that the fire devastation presented an opportunity for developers to aggressively remove some of the remaining trees in the area for the sake of commercial gain: "And of course that's the perfect opportunity for developers to come and say, 'Oh well, nothing can be done here', so they just flatten...yeah, flatten it all and they've been scraping and digging dirt around...for four or five years" (ST).

When discussing issues surrounding development in the Kelowna area, a few of the interviewees referred to the example of Knox Mountain Park, which is located at the northern edge of the city, and where some forested portions of the mountain were affected by a fire in 1998. Residents described areas of the mountain that have given way to residential development in recent years (see Figure 4.8), and a resultant forest fire mitigation strategy in the form of tree thinning that has been employed near these new developments. This process is strongly opposed due to the negative effects on accessibility to forest recreation and views for these interviewees, who stated that they feel a sense of connection to the forested areas of the park and a responsibility to ensure that they are properly preserved (DK; RC):

> I've been riding on Knox Mountain for almost twenty years and I've seen it go from absolutely no development to encroaching on, we've lost all sorts of good trails because of development. And then they started thinning the trees to mitigate fire risk and I'm thinking, you stupid idiots, you wanted to live near a forest, and now you're afraid of...fire, it's just that crap attitude we've got going (laughs). (RC)

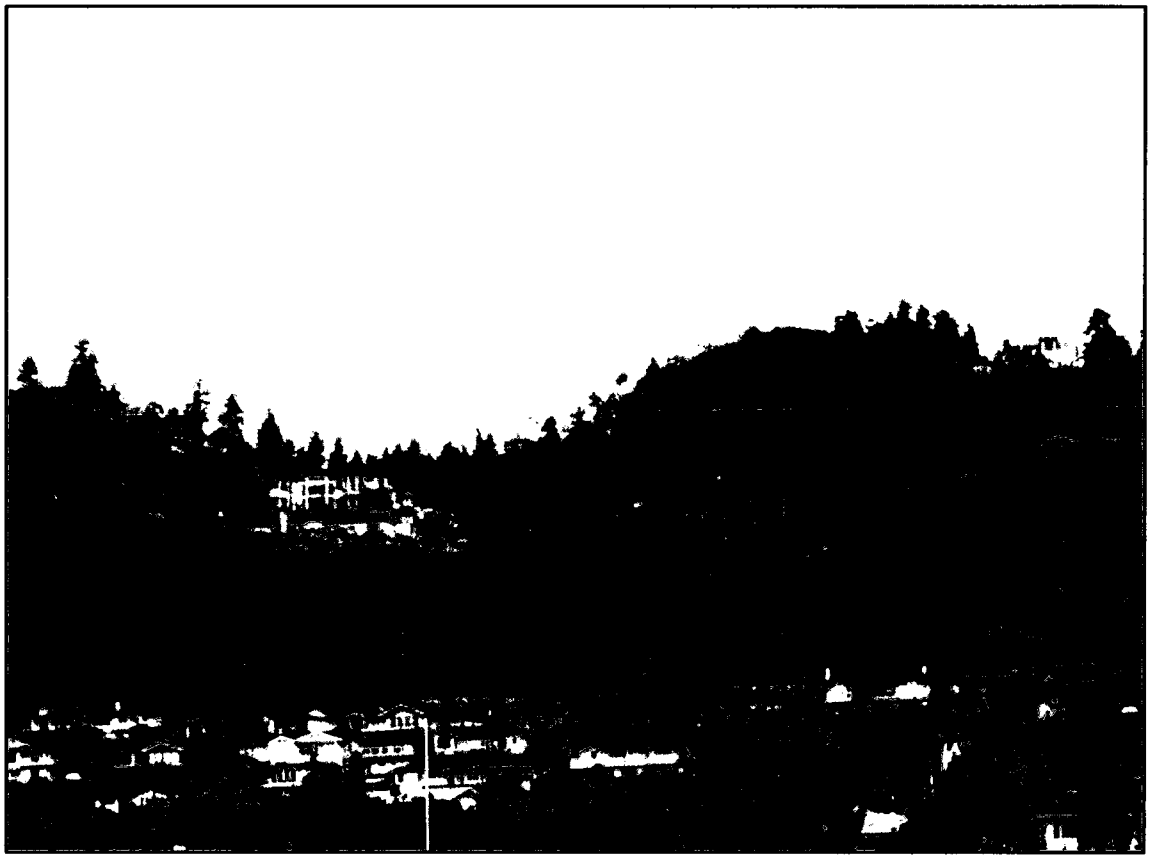

Figure 4.8: Residential development and forest thinning on Knox Mountain Park, City of Kelowna, September 2008 (M. Goemans)

The Okanagan Mountain Park fire altered the way in which some Kelowna residents experience their surrounding landscape. In the period immediately following the fire, the devastation of forests within a neighbourhood adjacent to the park was associated for one resident with a loss of normalcy, as 'nature' in this area was no longer immediately accessible: "It wasn't the loss of houses. It was seeing the trees. You can rebuild houses in a year. We won't get those trees back for a lifetime. The ambience is gone. People wanted to live with nature in the forest" (Colleen Dickson cited in Freake and Plant, 2004, 213).

Several interviewees described how they were drawn with a morbid curiosity to the park forests soon after the fire had been substantially extinguished, despite warnings from forestry officials of the dangers of entering these areas (due to forest floor instability and the threat of tree falls resulting from fire damage to root systems). The changes in appearance of the landscape that resulted from the fire were difficult to accept for many residents, who in part were still grieving the loss of such a large number of trees. Due to the drastic change that had occurred in the perceived character of affected parks, which was described by some as 'eerie', at first some found it emotionally difficult to return. The forest had become a damaged, unfamiliar, and somewhat frightening place (DK; RC; ST; VR):

> I don't walk in the forest any more. It's too black and creepy. It feels like I shouldn't be there – like it wants to be left alone to grow again. (Tracy Sharpe cited in Freake and Plant, 2004, 173)

> It looked like white with black sticks. I've never seen a forest fire before, so I was surprised how many trees still stood. And the forest was so full of trees that it was just black, and the ash was white, so that's what it looked like for a while. It was weird. (ST)

> I went illegally into the fire area (laughs). I don't think any of us could help ourselves....I couldn't believe the damage...and then in November, so two months after the fire we were mountain biking in the area. It had snowed the night before, but there was no snow on the roads...there was steam coming out...so that snow was melting into the ground and then being evaporated...and that's when I knew why they said it was too dangerous to go into the park, and I didn't go back...because I understood the burn, but I didn't understand it until then. (RC)

Yet despite the dramatic aesthetic changes that resulted from the fire, many residents have chosen to stay in affected neighbourhoods, in many cases attempting to reestablish urban forests in their areas in order to regain a sense of place (Farrell, 2003; Plant, 2008). Others have chosen to focus on the positive aspects of changes to the landscape, such as the expansive views of the surrounding lake and mountains that have been opened up as a result of clearing once forested lots (Mervyn Andrews cited in Freake and Plant, 2004; Plant, 2008). One affected resident commented, "...we all have to get in the mindset that the area will be just as beautiful but in a different way" (Colleen Dickson cited in Freake and Plant, 2004, 214).

4.2.2 Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Aesthetically Valuable' Perspective

There are indications that many Kelowna residents are in favour of proposals to alter the city's fire mitigation policies in general, though some have voiced concern about what they consider to be excessive removal of vegetation on individual properties. Kelowna's Fire Chief noted that while many in the community have supported local fire mitigation efforts, "[the fire department does] meet with some resistance. They don't outright say they don't want to do it, they just simply give us 'this is my property, and I'll treat it how I like', if you will" (R. Blanleil, personal communication, December 12, 2008). In a

door-to-door survey of Kelowna residents conducted as part of the municipal *Review of Policies, Procedures and Bylaws Related to Wildland Fire*, the majority of those surveyed supported changes to city bylaws for the purpose of increased forest fire safety, though provided they were 'within reason'. A significant minority of those surveyed expressed some reluctance to alter landscaping on their own properties due to the 'character' provided by existing vegetation. As well, when asked about development practices within the city's forested areas, the majority of those questioned stated they were against the complete removal of vegetation within new residential developments, supporting instead "...the sensitive integration of housing into the landscape at the expense of some security from wildland fire" (B.A. Blackwell & Associates, 2006, 19).

For one interviewee, a reluctance to follow *FireSmart* guidelines that would reduce vegetation on individual properties was linked to concerns about loss of privacy as well as money that had previously been invested in landscaping (WR). Another resident admitted to an emotional connection to the trees on her property that made it difficult to consider their removal (ST). In contrast, support by one resident for individual forest fire mitigation efforts was linked to her preference for a more managed landscape; in this case she associated pruning or removal of trees with keeping her property 'tidy' (PI).

When asked if limits should be imposed on development into forested areas within Kelowna, one resident in favour of limiting development cited concerns about how the removal of forest that would be necessary for urban growth could potentially have negative effects on the character of the city (TG).

4.2.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Municipal and Regional Parks from the 'Forest as Aesthetically Valuable' Perspective

According to Kelowna's Urban Forestry Supervisor, general anxiety about future fire risk that existed among many residents of the city shortly after the 2003 fire appears to have lessened over time; over the same period, resistance to forest thinning has increased. Several residents have voiced their opposition to the removal of trees in parks that border residential neighbourhoods, citing concerns about loss of privacy for individual properties in the area (I. Wilson, personal communication, August 8, 2008):

> Some people are very against...[the] loss of privacy, to the point where even after we explain what we're doing and why it needs to be done, that they're basically like 'Well, I don't care if my house burns down, that's what insurance is for', or that response, and some of them, though this is a very small proportion of homeowners, but to some of them that loss of privacy is even more important than the protection of their property... (I. Wilson, personal communication, August 8, 2008)

Some of the residents who were interviewed expressed support for tree thinning projects in regional and municipal parks. One interviewee equated the removal of excess vegetation in park areas with an ordered landscape and a more accessible space (SJ). Another resident suggested that differing priorities be placed on maintaining park vegetation, based on perceived differences in aesthetic (as well as hazard) value among vegetation types (ST):

> You know, there's one person's idea of a tree and another person's idea of a tree. Dry sticks and the dogwood, the natural rose bush that's all thorny, to me that's not a tree. To me it would be clean it up, get rid of it...Dry sticks that look like kindling should be removed! (laughs) Big lush green trees, they should be left alone... (ST)

4.2.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and Crown Lands surrounding the City of Kelowna from the 'Forest as Aesthetically Valuable' Perspective

Concerns have been raised among a number of Kelowna residents that the aesthetic and recreational qualities of surrounding crown lands and provincial parks could be negatively affected by forest fuel modification projects (M. Ladd, personal communication, August 15, 2008; Natural Resources Canada, 2004). The Parks Area Supervisor for B.C. Parks noted that differences in opinion exist among residents about how local provincial parks should look. As he described, some residents have voiced a preference for new trees to be planted in places within the park that were burned, as they do not like the look of the native grasslands that have grown in these areas following the fire. Others have voiced concerns that these changes in landscape may alter what they consider to be the conventional attributes of area campgrounds. However, the Parks Area Supervisor also commented that public information meetings held with local neighbourhood groups, in which residents were permitted to discuss their concerns, have aided in part to reduce residents' resistance to the aesthetic changes taking place in some park landscapes (M. Ladd, personal communication, August 15, 2008).

4.3 The 'Forest as Inherently Valuable' Perspective

4.3.1 Residents' Interpretations of the Value of Forest Health

In the years after the 2003 fire, local media reported that for some Kelowna residents, the most painful loss experienced was that of neighbourhood forests (Plant, 2008). The damaging impacts of the fire on elements of local forest ecosystems other than trees, such as habitats and food sources for local wildlife, were also acknowledged (Freake and

Plant, 2004, 197). For some members of the community, the assertion that fire in forests is part of a cyclical and natural process has aided in accepting the extent of damage to trees and wildlife that resulted from this disturbance (see Figures 4.9 & 4.10). Shortly after the fire, the director of Kelowna's Nature Centre Society described the newly burned environment as a "...'Garden of Eden' for deer, moose, goats, mountain sheep and many types of vegetation" ("Nature Centre", 2003). The resident of one devastated neighbourhood (that has since been rebuilt) commented on the fifth anniversary of the fire: " 'We can do our best to beautify our property, but, in the end, it doesn't belong to us. We realized this wasn't our land. We're just caretakers. ... There will be another fire 100 years from now. Nothing is permanent, so be present – live in the moment' " (Lynn Wallace cited in Plant, 2008).

Despite some initial fear and hesitancy to reenter the provincial parks in the months immediately following such a large scale disaster, some of the residents who were interviewed recalled how during this period they witnessed what they described as the beauty of regrowth resulting from natural disturbance (see Figure 4.11):

> It's a beautiful thing watching the forest regrow. It's a privilege to see this happen. There are not many people who can see that. I mean in a strange way it's kind of an incredible view that you get. The second year after the fire it was above our heads. Incredible to see...beautiful. (RC)

> When it first, um, after it first went through, we said, 'oh, I don't know if we want to go back out there.' So we started taking in little doses....Then we started to notice that little leaves and branches were starting to come in the fall. That quickly. It was amazing. And sometimes the ash would actually be 6 inches deep in some of those places. And you'd think, well nothing is ever going to grow in there, but you'd see little chutes coming up. It was really interesting. And it's lovely. Again, it had a fully different beauty than it had before... (PI)

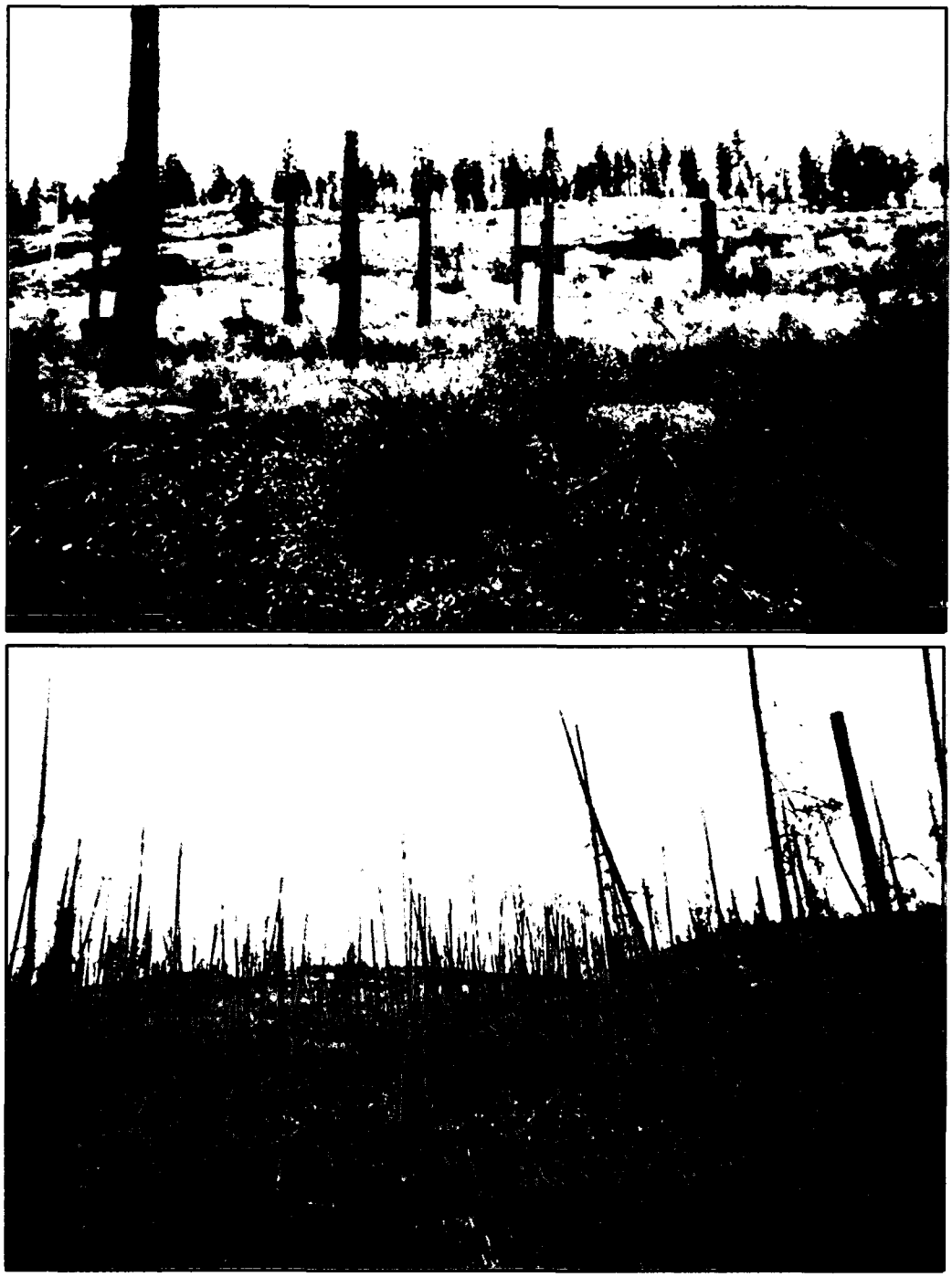

Figure 4.9: Images of post-fire forest regrowth photographed by one interview participant (with accompanying comments): (a) (top): "A regional park in 2003 fire area. Burnt (and dead) trees are cut high, which reduces liability of branches or trunk falling and hitting someone, yet provides some wildlife habitat." (WH); (b) (bottom): "Burnt area with everything left in its natural state. Prefer to all other examples." (WH)

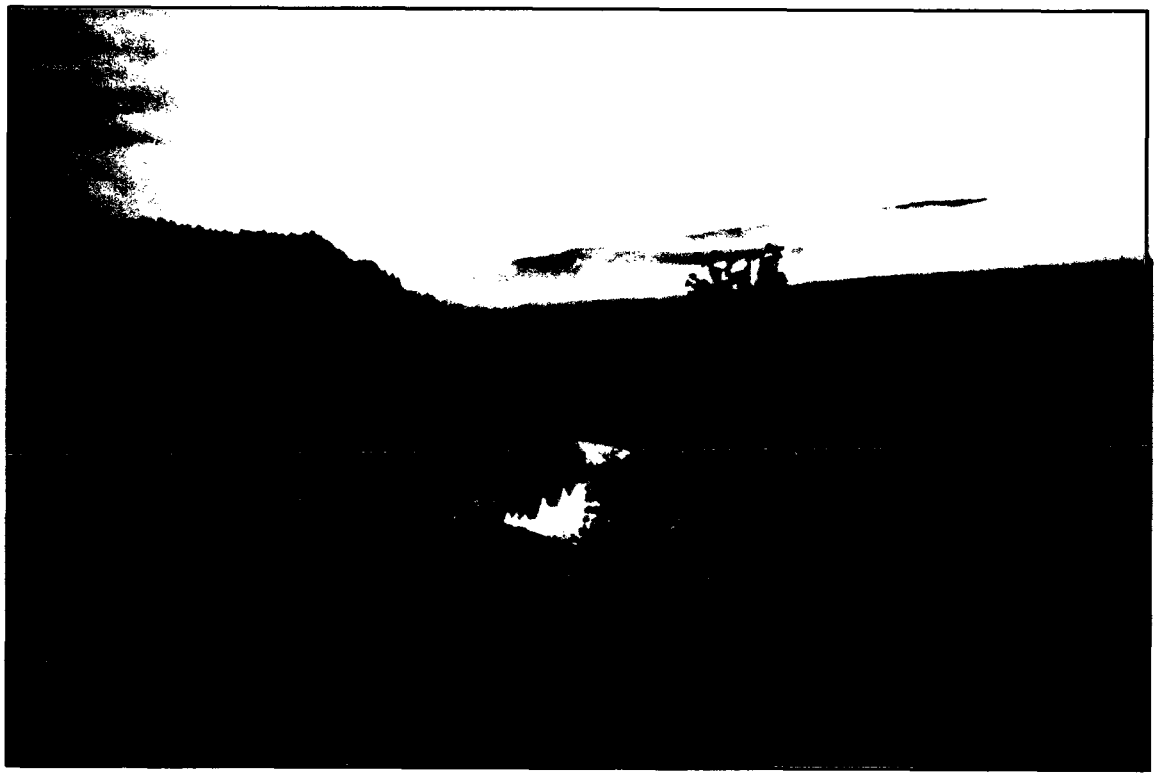

Figure 4.10: Image of post-fire regrowth photographed by one interview participant (with accompanying comments): "Kalamalka Lake Provincial Park native Bluebunch Wheatgrass. Not many native grasses left in the Okanagan. They'll eventually require fire to keep surviving. I favour the natives." (VR)

Figure 4.11: Image of growth of fireweed in burnt forests, photographed by interview participant in June 2005 (PI)

Conflicting views exist among community members regarding how best to preserve forest ecologies in surrounding provincial parks. There exists continued support by some local naturalist groups for the Class A designation (and associated restrictions on forest alteration) of neighbouring provincial parks (John Woodworth cited in Government of British Columbia, 2003). When Myra-Bellevue Park just south of the city was designated as a Class A Provincial Park in 2004, the naturalist group known as Friends of the South Slopes (FOSS) openly supported the measure, which they asserted would allow the park to be "...preserved forever in its natural state for the enjoyment of future generations" (Thompson, 2004, 1). According to the group's newsletters, one of FOSS's main projects is the maintenance of trails in provincial parks, in order to facilitate community residents' experiences within local wilderness settings. In the eighteen months immediately following the fire, during a period when all of both Okanagan Mountain Park and Myra-Bellevue Park were closed due to safety concerns about tree falls and loose ground, the group also actively lobbied B.C. Parks in order to gain access to portions of the park untouched by the 2003 fire. In one of the group's newsletters, they expressed sympathy with others in the community who were, "...losing patience, ignoring the closure, and returning to their beloved trails" ("So why are the parks", 2004/2005, 2).

Some residents who were significantly impacted by the fire have asserted that the Class A designation in provincial forests is partly responsible for the destruction of neighbouring residential areas. These residents also blame the Class A designation for a lack of substantial implementation of forest fire mitigation (i.e. fuel thinning) projects in Okanagan Mountain Park prior to 2003 that could have lessened the damaging impacts

on local forests during the Okanagan Mountain Park fire. One resident noted, "The province has been pandering to environmental groups that say the park should remain in its natural state" (Dennis Hostland cited in Natural Resources Canada, 2004), while another asserted, "To all tree lovers out there, I can only say look at what happened to us. If our forest companies could have operated freely, and if the provincial government had allowed forest management in Okanagan Mountain Park, as was recommended many times, life here would be different" (Murray Roed cited in Natural Resources Canada, 2004).

4.3.2 Responses by Kelowna Residents to Forest Alteration Recommendations within Individual Properties from the 'Forest as Inherently Valuable' Perspective

When asked if they support *FireSmart* recommendations to remove or replace vegetation in order to mitigate the potential effects of forest fires on their properties, some interviewees voiced opposition to what they consider to be excessive tree thinning. Concerns noted in this respect included the potential depletion of soil nutrients or loss of wildlife habitat on forested properties, effects the residents asserted would result from the removal of too much vegetative debris (RC; WH):

> These overmature, dead and dying trees, those old veterans, they're quite an important tree to many species. They provide a nesting spot, that sort of thing....a single tree, I don't think is a threat....I think if there's not fuel underneath, then I think they're great. Some bird species hunt on the tops of them, they use them as their lookout. (WH)

One resident suggested a preference for responsibly planned fuel breaks within residential developments (i.e. the complete removal of trees in strategic locations) in areas such as communal greenspaces, over general tree thinning. In her view, this would

ultimately protect more overall square footage of the forest (RC). When asked about the proposed municipal recommendation that homeowners be responsible for forest thinning on public lands that are situated next to their own properties, this resident also suggested that, in the best interest of the health of local forests, she would rather see experienced forestry officials or responsible developers, rather than individuals, manage this type of work. She noted, "To make landowners responsible for public lands… are we going to train them how to do it so that you're not damaging other things? It's great to make people responsible, but I'd rather see it supervised" (RC).

Differing responses regarding effects on forest health were received from residents when asked if any limits should be imposed on residential development into forested areas around Kelowna (see Figure 4.12). One interviewee stated that she is not overly concerned about excessive rates of forest loss due to development, as she believes that existing development controls in the region (for example, the Agricultural Land Reserve in Kelowna) will help to preserve and maintain a sufficient proportion of undeveloped land in the region (WR). Another resident noted that she sympathized with individuals who wish to settle within forested environments, but cautioned that excessive development within forested spaces could potentially result in a disassociation of new residents in these areas from their surrounding ecology. As she described, "…it doesn't seem right to me to take down all the trees….They've taken every tree out, the houses are only about 5 or 6 feet apart….And I don't think that that is conducive to people thinking about their environment" (PI).

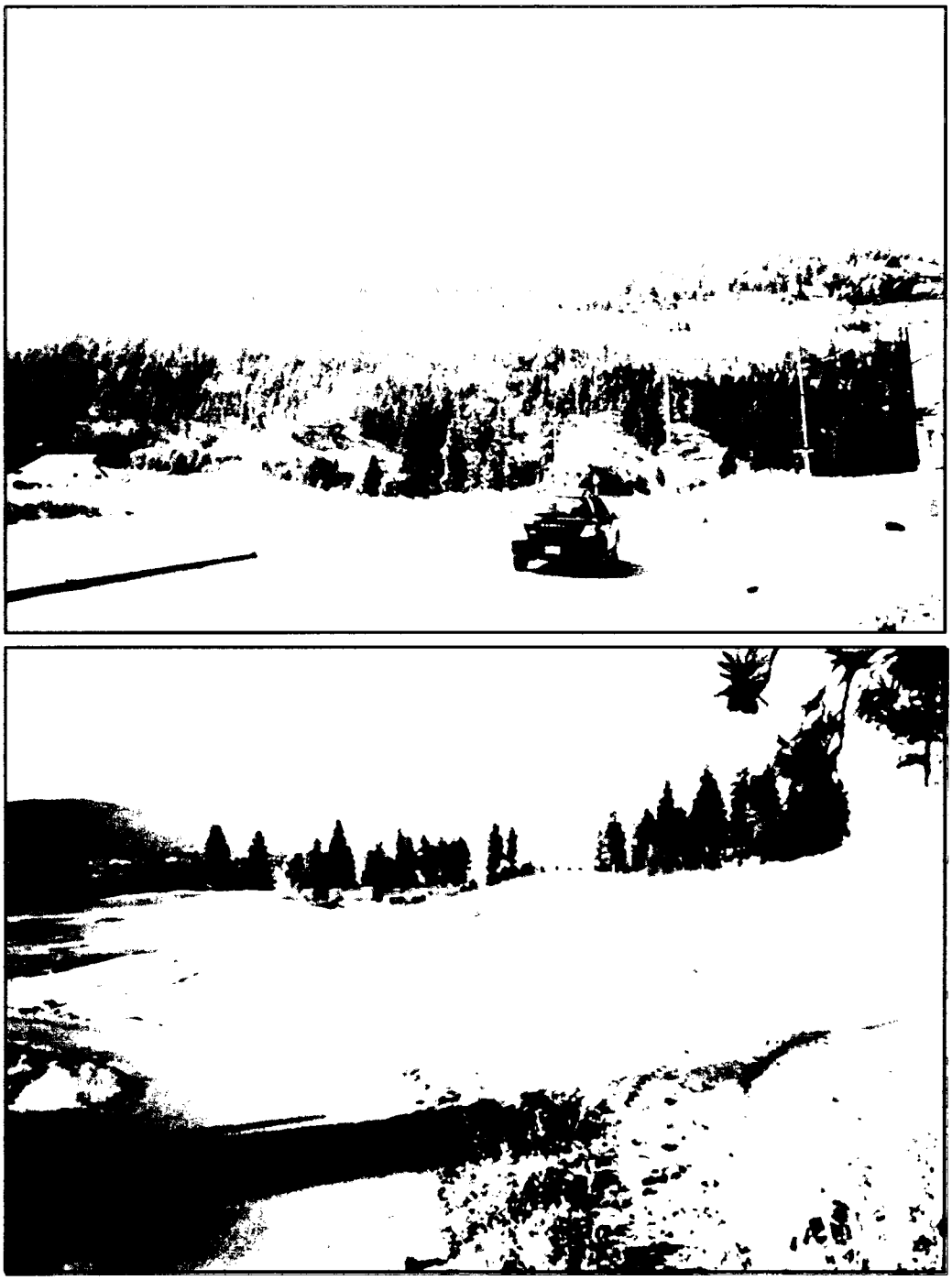

Figure 4.12: Images of unappealing features of Kelowna photographed by interview participants (with accompanying comments): top: "West Kelowna Estates developed after the fire. Note all trees are cleared for development. Treed area is likely waiting for development. I believe this is inappropriate." (WH); bottom: "Forest destroyed for a vineyard that will grow." (TR)

4.3.3 Responses by Kelowna Residents to Forest Alteration Recommendations within Regional and Municipal Parks from the 'Forest as Inherently Valuable' Perspective

Kelowna's Urban Forestry Supervisor described how some residents have expressed opinions about forest thinning on city-owned properties based on their visual assessments of what constitutes the natural state of the forest. In his opinion, residents have often associated what is 'natural' in forests with what has been affected by human activity for some time.

> ...people want those areas to be left alone. But the challenge of course, in an urban area like this, where people consider it to be natural, it really isn't. It's faced a lot of change....We haven't allowed fires to go through, and there's previous logging, and all kinds of human influences on our natural areas, so we're now in a situation where we have to go in and physically do some of the treatments that Mother Nature would have taken care of by herself. (I. Wilson, personal communication, August 8, 2008)

When Kelowna resident interviewees were asked their opinions about mechanical tree thinning efforts taking place on city-owned properties in Kelowna, several residents expressed support for mechanical tree thinning projects in city parks, linking this type of approach with the protection of existing and established trees in these areas from future large-scale fires (CK; HW; TR). One resident commented, "For me it comes back to, would you rather lose some vegetation now, or lots in a fire?" (CK). Another noted, "...it can be a beautiful thing. There doesn't have to be any particular loss of natural beauty. It can be an enhancement....And then everything else thrives..." (TR). However, another interviewee voiced her objection to the removal of brush in park forests, associating this process with the removal of valuable nutrients (as brush decays back into soil) from municipal forests. In her view this would lead to increased

vulnerability among individual trees to disease and the damaging effects of any future large scale fires (RC).

One Westbank resident asserted his preference for prescribed fire as a more beneficial approach for local forest wildlife species over mechanical thinning:

> ...it used to bother me when the fire people would hire people....and then [as a result of mechanical thinning] they came and they stripped all what I thought was great habitat for birds and mammals....I actually think that controlled fires, at the right time of year and so forth, where the conditions are right that they can control it from getting out of hand, is probably a pretty good thing for the environment, generally, and for wildlife. (WH)

4.3.4 Responses by Kelowna Residents to Forest Alteration Recommendations within Provincial Parks and Other Forested Areas Surrounding the City of Kelowna from the 'Forest as Inherently Valuable' Perspective

It has been noted by provincial forestry officials that an initial interest shortly after the 2003 fire in hazard reduction through forest thinning within provincial parks appears to be decreasing for some residents, as other strategies that emphasize the preservation of trees within these forests have gained in popularity (M. Ladd, personal communication, August 15, 2008; Palmer, 2007). While some residents who were interviewed advocated for selective tree harvesting as a measure which provides "...short-term pain for long-term gain" (CK) and a more sustainable approach to fire mitigation than clearcutting (TR), other residents expressed more cautious views. One resident expressed concern that if the methods of tree removal employed by forestry agencies for fire mitigation were followed incorrectly, it could upset the forest's natural pattern of regrowth:

> The forest was in a serial stage, like the forest comes, after burn you've only got pine trees, and then as time goes on the fir start to come, and so there were quite a few smaller fir in amongst the trees but because they were cleaning it up and getting it spacing and stuff they took the fir out....they followed the prescription, but I'm not sure it was the right prescription. (PI)

This resident also suggested that over-management of provincial parks could potentially have negative effects on the wilderness attributes of these areas (PI):

> I don't think [selective harvesting is] fair. ... And we should try to let it manage itself as nature would have managed it, because if you start managing everything, do we want our parks to look like downtown Kelowna? Or like Kelowna city parks? Is that what we want, is that the right thing for the land? I don't know. I don't think so. So I'm opposed to doing harvesting in parks. (PI)

Advocating for limited human intervention within provincially-owned forested areas, one interviewee attributed existing forest vulnerability to large-scale wildfires to previous long-term fire suppression strategies:

> It never made sense to me, because fires are supposed to catch fire to renew themselves. As much as we might think it looks ugly afterwards, it's also...there's a cycle that's supposed to happen, and we've been interfering with it for so long that we've just created a terrible, terrible situation....it's really our fault for all the damage that's been caused. We haven't let the forests burn as they're supposed to. (RC)

However, this same individual also acknowledged that management of a portion of the area's forests in order to ensure the safety of surrounding communities is inevitable; regarding these cases, she expressed support for measured and thoughtful strategies for intervention that balance considerations of human safety with respectful and responsible forest ecosystem management policies.

> ...Whenever something bad happens, something good comes out of it, and hopefully the fire that we had will teach us something about the previous management of our forests, and it sounds like they are. But it can also promote fear, and make people go overboard...we get hot summers a lot here, and I don't think that means we start punishing the parks for the problems that we've caused. There are other things that live in there, and ...it's like shooting bears...we're in their house...we're the ones with the brains that should be policing... (Ibid)

Resistance to selective tree harvesting has been linked by some residents of Kelowna and other areas of British Columbia to concerns about logging in provincial parks, a process frequently perceived to be overly influenced by commercial interests at the expense of ecologically sound forest management (Carver, 2003; M. Ladd, personal communication, August 15, 2008). This connection between selective tree harvesting and commercial logging was also made by several interviewees (RC; SJ; WH), including one resident who suggested that recent threats of pine beetle infestation could also potentially be exploited to promote an overly-intensive strategy for tree removal:

> To do this kind of thing is an excuse for the government to get some money from the forestry companies. So that selective tree harvesting, it would have to be so selective. I saw a lot of damage caused by that...And I know that pine beetle wood is more likely to burn, but...let it burn, put the nutrients back into the soil, because these trees were weak in the first place because the soil was depleted of nutrients, and if we just remove the tree, we're not getting the nutrients back into the soil. (RC)

Another resident, whose home is on land adjacent to Myra-Bellevue Provincial Park and who stated that she is opposed to forest thinning in general, expressed a more tempered view regarding logging concerns when recounting how waste from a previous forest thinning project was handled:

> [Forestry officials] told people they were going to [chip up thinned trees]. Some people were really mad 'cause they wasted the wood. But, you know, they were told. And the policy with parks is, that this is something that the environmental people have pushed heavily and I'm not, I'm not an environmentalist dyed in the wool that I can't see both sides of the story. So the environmental people have pushed parks very hard to not allow any kind of cutting in the forest, or to have any kind of harvesting done in parks, because they see that as the opening of a door. Once you start to harvest stuff in there, then, you know, the next company comes along and they go, well, gee you know, you've still got 7000 board feet of huge fir out there. Why can't we have that? You've got new stuff growing, just sell it to us, we'll give you a really good price....And one government may allow it, and then you've changed the whole ecology of a forest that has been growing that way for the millions of years. So that's the way, I can understand that. On the other hand, if you're cutting the darn tree in the park, because it's either dead or it's not or whatever, I don't see any reason why a person should not be able to use that if it's being cut and removed or taken out, which was the case here. They cut these trees. They went in and chipped them all, which put the stuff back into the forest and then makes sure that the park makes no profit on it so the temptation is not there. But theoretically, is that right? I don't really think so. I think you could have said to the neighbours, come haul the wood away... (PI)

Residents expressed differing views regarding the effects of prescribed burning in reducing fire risk and promoting forest regeneration. Several residents who expressed support linked prescribed burning with an ultimate improvement in forest ecosystem conditions (SJ; WR); some described how the 2003 fire changed their views on the role of burns (natural or prescribed) in maintaining forest health:

> ...there's no reason why a controlled fire couldn't be used as we did here. In fact I think to manage properly you have to employ fire. It was part of the environment, and has been for thousands of years. I mean, the trees are resistant to it, you know, the trees aren't going to burn, the bigger trees. You've got to burn all that fuel and stuff that's accumulated. Back what they did, basically, was took out the dead and the dying and the weak, and that sort of thing, which is nature, basically...Fire is very much a part of our natural world, so we've got to employ it, preferably. (WH)

> What I learned was that at the time in Okanagan Mountain Park, they didn't do the selective, the controlled burns, which I see now are a good idea, because there's three hundred years of pine beetle built up and they don't break down, and leaves, and other things like that, so it's just dry and waiting to happen....And honestly the first time we were driving back up the road, and I was looking at the landscape, I said, 'It looks like Mother Nature came here with a big broom, and swept all that debris and crap away, and it was clean as a whistle. (ST)

One interviewee who voiced concern about prescribed burning in provincial parks (particularly Class A parks) cited the potential for further upset to forest ecosystems as a result of additional human intervention:

> I think we've already made advances in the park, by not allowing them to burn in the park, and if we try to fix our mess, I don't think we're very good at fixing up our messes. I don't think...we do it well. I think we just wait for nature. (RC)

4.4 Community Contributions to Forest Maintenance and Forest Fire Mitigation Strategies: Challenges and Opportunities

Comments voiced by Kelowna residents demonstrated a degree of interest among members of the group in contributing to forest maintenance and fire mitigation strategies for the community; however, there appear to be some challenges to implementing this type of approach. As mentioned earlier, Kelowna's Urban Forestry Supervisor indicated that in the years since 2003, it has sometimes been difficult to maintain the awareness of risk that initially motivated residents shortly after the fire to reduce the density of forest fuels around their properties (I. Wilson, personal communication, August 8, 2008). The city's Fire Chief also described how the community response to measures such as *FireSmart* has gradually declined in the years since the fire, saying that public education on the issue in general has 'lost a little bit of its zip' (R. Blanleil, personal

communication, December 12, 2008). Several residents who were interviewed stated that they had limited or no knowledge of disaster mitigation education initiatives that are currently in place in and around the city, and many also acknowledged that they were not aware of the *FireSmart* manual (DK; PI; RC; SJ; SS; TG).

Some challenges to the implementation of participatory mitigation strategies (as noted by residents) concern barriers to communication and trust-building that exist between forestry officials and community residents. For example, some residents expressed general cynicism about some of the forest maintenance and fire mitigation strategies put forward by the municipality and the province. As a result of his experience with the 2003 fire, one resident voiced scepticism about the degree of expertise held by provincial forestry officials in keeping the community safe from future devastating forest fires through fuel reduction efforts (DK). Another resident, who frequently prioritized the preservation of community forests over aggressive fire mitigation strategies, described what she viewed as an historical lack of progress on ecological sustainability issues in general within municipal government:

> It's getting better, but there's certainly a core of people and certainly the decision-makers are still kind of…stodgy. Slow to accept change, slow to do things in innovative ways. Our council has all these reports on sustainability, and every time a vote comes up in council for anything that's sustainable they vote it down. (RC)

Despite these concerns, other comments from residents reveal that opportunities exist for effective and informative public outreach strategies to address residents' perspectives about forest preservation, ecosystem health and community safety. Information campaigns put forth by municipal and provincial officials have had some

success in motivating participation from residents. In the years following the fire, residents have been encouraged to inquire with the City about specific strategies to effectively mitigate the risk of fire around their homes ("Has the Lesson", 2005). The city's Urban Forestry Supervisor also described ongoing efforts that have been coordinated with the fire department to educate residents about forest fire risk. These have included community meetings in which *FireSmart* manuals were distributed to residents, as well as visits to some residents' properties (I. Wilson, personal communication, August 8, 2008).

Several residents who were interviewed said they were aware of and expressed support for public education initiatives about fire risk in the Kelowna area, though they had not been a part of these events (RC; ST; WH). One resident, who lives on the edge of Myra-Bellevue Provincial Park and who described how she and her neighbours had received information from forestry officials about a forest thinning project near her home, linked public outreach efforts for fire safety to a potentially greater degree of connectedness between residents and their natural surroundings. As she explained,

> I think that kind of education is well worthwhile. I think most people haven't a clue. Partly because they're so far removed now from what nature does, that it doesn't occur to them that branches dragging on the ground is a great source for anybody to throw a match in" (PI).

Other residents suggested that more advance communication from the province about fuel reduction initiatives, in particular in regard to prescribed burning projects, could reduce residents' concerns about associated fire hazards:

> I think if you let people know that you're doing it....If they had said to you, 'Here are the risks. You could instantly lose everything.' You'd have to look at that, and you'd have to consider it....Not everybody's going to agree upon it, but I think they should be aware of it. (TG)

> The…thing we need to be careful with prescribed burns in our valley is that they let the public know because, they look up at the fire up on the mountain…I think it'd be great if they'd just say 'don't panic, it's just a prescribed fire'… (RC)

In some cases, information-sharing between forestry officials and neighbourhood residents has been shown to reduce fears about community safety during the implementation of a previous prescribed burning project. The positive response among residents to a prescribed burning project in Kalamoir Regional Park in 2006 was attributed by the RDCO's Parks Services Manager as well as one resident who was interviewed to detailed communication with residents prior to implementation of the burn (M. Kopp, personal communication, December 16, 2008; WH). Plans for the burn were first relayed through local media and letters that were delivered to residents neighbouring the park ("Prescribed burn", 2006), then during open houses (during which residents were invited to voice their concerns, and forestry officials explained the benefits of forest fire risk reduction that would potentially result from the project) (M. Kopp, personal communication, December 16, 2008).

As part of other fire mitigation efforts, forestry officials have communicated to residents that hazard mitigation strategies can have multiple benefits, which include the preservation of trees in addition to other aspects of ecosystem health in the community. Kelowna's Urban Forestry Supervisor described how the municipality now draws on residents' increasing public concern about loss of their local forests due to the coming pine beetle infestation (for example, almost 10,000 visits were made to the City's pine beetle website in 2007) to motivate residents during public information sessions to

remove vulnerable trees (I. Wilson, personal communication, August 8, 2008; Wilson, 2008). One resident who was interviewed also suggested that information on forest modification be presented within a context that relays the potential drawbacks of forest fuel buildup for other, non-human elements of forest ecosystems:

> To me we've got to incorporate it into the natural world. We've got to have information that also recognizes the wildlife habitat aspects, you know, for the frogs and the snakes and all the hazardous things that people don't like, but things that are important in the natural environment...how wildlife is affected by everything that you do, you know....If you could down a big oak tree, it's going to affect wildlife for sure. (WH)

Based on the concerns expressed by forestry agencies and Kelowna residents, it appears that several years after the 2003 Okanagan Mountain Park fire, there exist further opportunities to modify and enhance forest fire mitigation policies in and around the city.

Chapter 5: Discussion

Chapter 5 presents an analysis of the views expressed by Kelowna residents about their impressions of local forests, past and present fire hazards, and strategies for forest management and fire mitigation in and around the city, as detailed in Chapter 4. These views are interpreted according to the three nature perspectives ('forest as hazard', 'forest as aesthetically valuable', and 'forest as inherently valuable') that were introduced as part of the conceptual framework outlined in Chapter 2. Section 5.1 provides a deeper analysis of each of the three nature perspectives, then links these views to residents' acceptance or rejection of recommendations for community forest fire mitigation. Section 5.2 examines how the nature perspectives expressed by residents have been shaped in part by their experience with disaster. Finally, Section 5.3 provides insights into opportunities for the integration of residents' nature perspectives into enhanced public education programs, and explores methods by which residents can participate more fully in the development or modification of disaster mitigation strategies in forested communities at the wildland-urban interface.

5.1 The Varied Meanings and Priorities Placed on Ecologically Sustainable Forest Management and Community Safety among Kelowna Residents

A great deal of variety was observed among residents' perspectives about ecological sustainability and hazard in Kelowna's forests. Each of the three general perspectives displayed by residents about Kelowna's forests (forests as hazardous areas, forests as aesthetically valuable, and forests as inherently valuable) have influenced both acceptance and rejection of forest fire mitigation policies in and around the city.

Kelowna residents' views regarding area forests are often quite complex; individual interview participants sometimes expressed a range of perspectives, depending on various contextual factors. Some residents have differing perspectives of forests (and express differing opinions about fire mitigation efforts) depending on the scale at which mitigation measures are employed (e.g. individual properties vs. provincial parks), while others had varied reactions based on who would be implementing a particular mitigation strategy (e.g. homeowners vs. government agencies). Interviews with Kelowna residents also demonstrated that reactions to mitigation strategies were not always consistently influenced by the particular demographic factors of participants. For example, one resident who is a member of a naturalist group in the area, and who frequently expressed views from the 'nature as inherently valuable' perspective, also expressed obvious concerns about maintaining community safety (even if sometimes at the expense of neighbouring forests), as well as an interest in maintaining access to certain features of surrounding forests for recreational purposes. Examination of residents' comments also made apparent that individuals' responses to forest fire mitigation did not necessarily reflect the degree of devastation they experienced during the 2003 fire; some of the residents who lost homes or suffered severe damage as a result of the Okanagan Mountain Park fire also expressed acknowledgement of the benefits of fire disturbance in maintaining forest health. These variations among residents' perspectives demonstrate that identity is a complex and unique formulation of myriad aspects of social differentiation.

5.1.1 The 'Forest as Hazard' Perspective

Residents who described forests as potentially hazardous areas focused on the destructive aspects of the Okanagan Mountain Park fire on both built settlements and surrounding forests. For these individuals, the 2003 fire was experienced as an unusual and unnatural event, the result of inadequate suppression measures by provincial forestry officials. This perspective resembles (and is potentially influenced by) modernist views that were actively promoted by Canadian forestry agencies over most of the last century, in which the forest fire itself was the primary factor in disaster impacts and a force to be conquered, without consideration of the other risks involved with vulnerable patterns of settlement in WUI communities.

As many residents were direct witnesses to the 2003 Okanagan Mountain Park fire, the disaster had a significant emotional toll on community members, involving, understandably, moments of panic, fear and helplessness as the fire first burned, then grief, depression and loss of normalcy and stability in the months and years that followed. Although, fortunately, no residents died as a result of the blaze, some of the residents who were not directly physically impacted by the fire (i.e. had not suffered damage to their homes) expressed substantial concern for animals that had been victims of the fire, and empathized with the emotional disturbance experienced by community residents who had lost their homes. The images contained within Figure 4.1 (p. 87) display the views to which residents of Kelowna were exposed during the most intense period of the disturbance, in close proximity to the fire as it burned on the edge of the city in August 2003. Billowing smoke fills the frame of all of the photos, while the intensity of the flames is effectively conveyed in the night image of the blaze in Figure 4.1(b). Figure

4.1(a) captures the surreal quality of the experience for the community, the image of the burning neighbourhood resembling dramatic news footage. The photos in Figure 4.2 (p. 91) capture the disturbing yet somewhat awe-inspiring aftermath of the fire as documented by residents, during which time burned houses and forests contrasted with appealing lake views beyond [Figure 4.2(a)], and grey ash coated once green forests [Figure 4.2(b)].

As a result of their experiences with the 2003 fire, some residents perceive area forests as volatile places, to be managed, controlled, and removed if they pose too large a threat. Residents who expressed views from the 'forest as hazard' perspective often supported mitigation strategies that would sacrifice portions of forest or maintain fire suppression policies if required to improve community safety. They frequently supported substantial measures of human intervention, often in the form of perceived 'expert' solutions [as was also demonstrated in Morris-Oswald's (2005) study], in order to manage future threats in forested areas. Some displayed less resistance to development measures (e.g. buffer zones or roads) that they may previously have not supported, if these measures could be demonstrated to ultimately reduce risk to the community.

More intense perceptions of fire risk among residents could result in the rejection of particular disaster mitigation methods such as prescribed burning, due to concerns about unhealthy smoke conditions and potentially out-of-control burns. However, when residents perceive the potential threat of large-scale fires to such a degree that they feel overwhelmed or helpless, they may view smaller measures to prevent fire damage (such as individual homeowner efforts) as futile in reducing the impact of large-scale fires.

5.1.2. The 'Forest as Aesthetically Valuable' Perspective

Residents who emphasized the aesthetic value of forests in and around Kelowna often viewed the retention of forests as an important element in maintaining the character of the community. For some residents, the city's natural surroundings form part of their personal identities, influencing their recreational activities as well as the choice to settle in the wildland-urban interface. Several of the photos that were taken by interview participants provide insight into their priorities for the maintenance of the city's natural areas, based on the aesthetic qualities of the surrounding environment. Figure 4.5 (p. 104) demonstrates the range in which forests are perceived as appealing to one Kelowna resident, from a more ordered landscape within a local city park, praised for the fact that many trees have been planted or retained [as seen in Figure 4.5(a)]; to the more 'natural' look of forests that have been preserved as part of a hiking trail beside a creek that runs through a southern section of the urban landscape, valued as they allow easy access to nature within the city. The photos that were taken of vegetation surrounding another resident's property [as shown in Figure 4.6 (p. 106)], display her preference for a more managed landscape as part of her immediate surroundings, in contrast to her appreciation for the expansive and forested 'wilderness' parks that dominate distant landscape views.

Braun (2002:11) suggests that in contemporary North American culture, "...nature is increasingly remade in the image of the commodity", while Wolch (2007) observes that a predominant purpose for the preservation of urban nature is often its influence on property values and tourism. Kelowna residents live in a community in which economic prosperity (in particular, the large proportion of employment in the service industry) is closely linked to the area's forested environment; surrounding landscapes are

increasingly commodified by private ski resort businesses and other interests that make up the substantial tourism industry in the area, and forests are shaped in particular ways often to suit the requirements of upper-level income residents and visitors.

Many residents expressed the desire to live closer to the forest, in contrast to the separation between forests and development that is preferred among residents whose views more closely resemble the 'forest as hazard' perspective. The photos shown in Figure 4.7 (p. 107) clearly express one resident's preference for living in among the forests surrounding her property: the trees that grow close to the exterior of her home fill the frame of Figure 4.7(b), while Figure 4.7(a) provides a view of a local forest that is valued as a source of daily recreation and restoration for this resident. Several residents expressed resistance against previous development policies that have restricted their access to surrounding forests, for example the construction of homes adjacent to Knox Mountain Park, as well as the development of golf courses that have blocked entry previously available to provincial parks south of the city.

Some of these individuals tended at times to be less focused on the potential for future forest fires to affect the community, prioritizing instead, as Castree (2005: 21) describes, their "...emotional attachments to particular landscapes." As a result, some residents who value the aesthetic qualities of forests appear to have grown increasingly complacent in the years since the fire, now more willing to accept a degree of fire risk in order to maintain natural surroundings according to visual priorities such as maintaining privacy or accessibility to views. This perspective resonates most closely with settlement preferences that may voluntarily lead to a condition of 'reconstructing vulnerability' to natural disturbance, as has previously been described by Etkin and Stefanovic (2005,

477). Elements of their immediate landscape are perceived by some residents as personal property, and in certain cases, are valued over their own homes (which could be replaced with insurance in the event of a large-scale forest fire).

Many of these residents also resist disaster mitigation strategies which they associate with the further removal of municipal or provincial park forests. As was also evidenced in Helford's (2000) examination of the Chicago Wilderness project, residents who display this perspective could potentially resist disaster mitigation policies which do not correspond with familiar perceptions of local forests, such as strategies which result in the regrowth of native grasses (rather than the dense forests to which residents had grown accustomed) or which significantly alter recreation spaces.

5.1.3. The 'Forest as Inherently Valuable' Perspective

Residents who described their impressions of community forests as inherently valuable often acknowledged fire as an inevitable and natural event, a source of regeneration for the forest, and an opportunity for new growth. This perspective is effectively captured in an image of vegetative regrowth that was photographed during the period immediately after the fire by a study participant (see Figure 4.11, p. 118). The photograph displays the contrast of new growth of delicate purple fireweed that rises up among the burned and black remains of trees, removing some of the former starkness from this Kelowna area forest. No doubt this focus on the regenerative aspects of disturbance, as expressed by residents whose views correspond with the 'forest as inherently valuable' perspective, has been influenced in part by increased ecological awareness within contemporary society in general, as well as the growing acknowledgement among Canadian forestry agencies of

the negative ecological effects of previous mitigation strategies involving complete fire suppression.

Residents who stressed the inherent value of forest ecosystems frequently expressed preconceptions of how they thought nature should exist (for example, as untouched 'wilderness'), though sometimes associating what was 'natural' with what had been affected by human activity for some time. These residents often perceived forested landscapes as victims of human intervention, and [similar to the 'eco-citizenship' model described by Wolch (2007) and Desfor and Keil (2004), and the 'ecocentrists' identified by Castree (2001) and Braun (2002)] the care of these forests was frequently linked to residents' personal identities as protectors of wilderness areas.

Residents who prioritize ecosystem health as part of forest maintenance appear to accept that this may result in a greater degree of risk to personal properties from forest fires. They often express concern about the methods (and motives) by which fuel reduction efforts are implemented, and either support or reject recommendations based on the perceived potential for certain strategies to benefit or damage elements of forest ecosystems such as soil health or wildlife habitats. Some may be more likely to support expert strategies to maintain forest health within the city's forests, rather than relying on individual efforts which may further unknowingly damage local ecosystems.

5.2 The Influence of Disaster on Perceptions of Nature

Of the many WUI communities across Canada, Kelowna is one of the few that has been significantly impacted by a large-scale, damaging wildfire. The Okanagan Mountain Park fire was the largest fire disturbance in British Columbia's history, and had great

physical and emotional impacts on many community residents. This difference between wildfire threat and wildfire experience has had a substantial influence on many residents' perceptions of their natural surroundings.

As a result of this disaster, many residents expressed that they now experience a new sense of vulnerability to natural forces, and are more aware of the risks of living near forested areas. This heightened sense of risk appears to have influenced residents' responses to mitigation recommendations in the period immediately after the fire, as, according to municipal forestry officials, fuel thinning activities on residents' individual properties were greatly increased. The motivation to act on mitigation efforts resulting from fears of other forest fire threats also appears to have declined considerably over time.

Some of the residents who emphasized the aesthetic benefits of living in a forested environment also stated that they now have a more enlightened perspective regarding the risks this pattern of settlement entails. The visual changes to individual properties due to the loss of vegetation were hard for some residents to accept. Other residents consciously adjusted their perceptions of forests as a result of the disaster, choosing to focus on the beneficial aspects of altered landscapes such as newly opened views that are now visible from their properties. The large numbers of trees that were lost during the 2003 fire also negatively affected some residents' impressions of neighbouring provincial park forests, as burned treed areas became unfamiliar, unattractive and somewhat desolate places.

Among those who expressed opinions about the inherent value of Kelowna area forests, the Okanagan Mountain Park fire altered residents' perspectives regarding the value of disturbance, as they observed the marvel of forest regeneration. This reaction

was observed even among some residents whose homes had been directly impacted by the 2003 fires, and who acknowledged a new acceptance of the inevitability of forest fire disturbance. For other residents, perceptions of forests have changed over time. Many described how shortly after the 2003 fire they were initially disturbed by the damage incurred to treed areas affected by the burn and were reluctant to return to these areas; years later, witnessing the process of new forest growth that has since taken place has changed their opinions regarding the value of fire disturbance for the renewal of forest ecosystems.

5.3 Steps Toward an Inclusive and Participatory Approach to Forest Fire Mitigation in Kelowna: Challenges and Opportunities

As emphasized earlier in this report, the range of views about forest management and forest fire mitigation that have been presented as part of this study do not fully reflect the extent of perspectives that potentially exist among Kelowna area residents. This section of the report presents established approaches to fire mitigation that have already garnered positive responses from community residents, as well as some additional options to enhance mitigation efforts in WUI communities, based on the deeper understandings gained of the perspectives of the selection of Kelowna residents that were interviewed for this study, as well as residents who expressed their views to provincial and municipal forestry officials and within literature about the fire and its aftermath.

Participatory approaches to the development of forest fire mitigation strategies have already been implemented at the federal and provincial levels, as described in the *Canadian Wildland Fire Strategy* and the *FireStorm 2003 Provincial Review*. At the

municipal level, the City of Kelowna has demonstrated an interest in soliciting feedback from community residents as part of municipal sustainability initiatives that include its *FUTUREOK Initiative* for overall community sustainability and the *Kelowna 2020* program to revise the city's Official Plan. Municipal and regional officials who were interviewed described public outreach efforts that include open houses and visits to residential properties to address residents' individual fire mitigation concerns. As well, many Kelowna residents have expressed interest in contributing towards effective and lasting forest fire mitigation strategies. This degree of interest was evident in particular during the public consultation process in the immediate aftermath of the fire that formed part of the *FireStorm 2003 Provincial Review*; in his reflection on this process, Filmon (2004, 6) noted, "We were impressed with the commitment of citizens to addressing the problem, and their willingness to entertain new approaches and solutions to safeguard their communities."

Currently, several years after the 2003 Okanagan Mountain Park fire, persistent challenges in gaining residents' support for fire mitigation remain, while opportunities to include Kelowna residents in generating mitigation strategies tailored to the varied needs of the community have become apparent. These challenges and opportunities are presented in the sections that follow.

5.3.1 Addressing Residents' Nature Perspectives as part of Education Initiatives for Forest Fire Mitigation

Provincial and municipal forestry and fire officials who were interviewed identified links between levels of knowledge among residents about forest fire behaviour and their

motivation to support or implement mitigation recommendations. Several officials suggested that there exists insufficient awareness among many Kelowna residents of the continuing and full extent of fire risk involved with living in a dry, forested environment. For example, Kelowna's Fire Chief stated that areas of high fire hazard remain within rural forested areas that surround the city, such as those on the west side of Lake Okanagan. Comparing the situation to that within areas of the San Bernadino Valley in California, where fires can sometimes occur year after year, he asserted that areas vulnerable to future fires also include portions of remaining forest within Okanagan Mountain Park (R. Blenleil, personal communication, December 12, 2008). Officials also noted that it has sometimes been a challenge to motivate mitigation action even among those residents who are more aware of these risks. Among residents who were interviewed, many stated that they had not implemented the full range of mitigation actions that were recommended for their properties; this was attributed in part to residents' reliance on expert approaches in reducing hazard risk to the city, as well as residents' differing opinions about the degree of fire risk within forested areas around the city that were not directly affected by the 2003 fire. As was previously noted, residents also expressed concerns about the ineffectiveness (and perceived futility) of individual mitigation efforts in the face of large-scale fires.

Forestry and fire officials have also noted that community members must be made aware of the depth of challenges involved with implementing forest fire mitigation practices and policies. Provincial agencies involved with fire mitigation have suggested that somewhat unrealistic expectations exist among some community residents about the degree to which forest fires can be prevented during periods of particularly hot and dry

weather conditions. Municipal officials also commented on the need to raise awareness among Kelowna residents of other jurisdictional and physical restrictions (e.g. the limitations placed on municipal agencies to modify forests on provincial lands, and the difficulty in accessing treed areas within hazardous terrain for the purpose of thinning forest fuels) on the effective mitigation of forest fires in provincially-managed forests surrounding Kelowna.

Despite these concerns, several opportunities exist to motivate individual mitigation action as well as increase support for mitigation initiatives taking place on public lands in and around Kelowna. Forestry officials who were interviewed displayed a clear commitment to providing effective public education programs to reduce forest fire risk, and many interview participants also expressed interest in receiving detailed and timely information about fire mitigation efforts taking place in and around the city. Some of the general ways in which residents' concerns can be addressed through public education programs include the provision of: information that stresses the potentially recurring nature of forest fires, in order to address residents' lack of awareness of and concern about forest fire risk; increased public outreach prior to the implementation of specific mitigation practices such as controlled burns in forests surrounding communities, to help residents to prepare for the effects of the burn (i.e. smoke), and to reduce residents' concerns upon sight of the fire; and detailed information, perhaps in the form of workshops, about appropriate mitigation methods that can be undertaken by residents on their properties (to reduce fire risk as well as maintain healthy local forests). Other opportunities for effective fire mitigation education strategies that integrate residents' nature perspectives are presented below.

Public education initiatives may motivate increased mitigation action among residents by specifically addressing residents' perceptions about the ineffectiveness of individual efforts in protecting their homes against large-scale fires. Several residents who were interviewed indicated that their impressions of forest fire hazard were so intense that efforts to prevent damage within individual properties appeared futile. Education programs that incorporate the findings of researchers such as Cohen (2000) and Reinhardt et al. (2008) regarding the potential for individual mitigation efforts to effectively prevent damage to homes, whether or not they are in the fire's direct path and regardless of the fire's intensity, may encourage homeowners to modify volatile landscaping on their own properties. Education programs can also emphasize the potential for fire mitigation strategies within large forested areas surrounding WUI communities to reduce the likelihood that forest fires will reach this degree of large-scale disturbance (that could threaten neighbourhoods) in the first place.

Public education programs for forest fire mitigation are potentially enhanced by addressing residents' multiple perspectives and priorities about area forests. Kelowna's Urban Forestry Supervisor described portions of the city's public education programs that draw on residents' existing concerns about the pine beetle threat to motivate support for forest fuels management. Other opportunities exist to gain support for mitigation efforts by building on residents' personal experiences with local forests as well as their concerns about forest management. For example, for residents who emphasize the aesthetic value of area forests, tree thinning strategies can be presented in ways that highlight other potential benefits, including the opportunity to provide extended views of surrounding landscapes or to maintain neat and ordered landscaping on

individual properties or within city parks. Exposing residents through field tours to the aesthetic appeal of native vegetation (e.g. grasslands) that returns to park forests following a fire disturbance may help to increase support for mitigation practices such as prescribed burns.

The potential for mitigation efforts such as controlled burns to benefit overall forest ecosystem health can also be emphasized as part of public information strategies; these positive effects could include the provision of wildlife habitats as well as the regeneration of forest soils. As was also noted by Prather et al. (2008) in their study of conflicts between Mexican spotted owl conservationists and fire mitigation agencies in forested areas of the southwestern United States, mitigation strategies can be presented as measures that potentially preserve park forest ecosystems by reducing the risk of very large stand-replacing fires (which could otherwise devastate wildlife habitats). In each of these cases, a more nuanced understanding of the varied social constructions of urban forests that are held by residents can help officials to more effectively harness other potential sources of public support for mitigation efforts.

5.3.2 Encouraging Communication and Establishing Trust: Incorporating the Nature Perspectives of Residents into Community Forest Fire Mitigation Strategies

Interviews with Kelowna residents revealed a need for greater communication and trust-building between agencies involved in forest fire mitigation and members of the community. Several residents who expressed views from the 'forest as hazard' perspective voiced general scepticism about the ability of forestry experts to effectively reduce the risk of large-scale forest fires in and around Kelowna. Several residents also

expressed frustration that their differing opinions with forestry agencies regarding the effectiveness of particular mitigation strategies to prevent future wildfires were not always fully acknowledged. For example, some residents debate the claim of forestry experts that local landscaping is a major source of fire spread within residential neighbourhoods, as many who witnessed the fire's aftermath saw that in many cases, "Manicured properties surrounded blackened holes where homes once stood" (Freake and Plant, 2004, 99). The photo of levelled homes surrounded by relatively intact landscaping that was taken by one resident shortly after the fire, as shown in Figure 4.4 (p. 97), reflects this perception. Particular mitigation methods were also viewed by some residents as sources of potential risk to the community; as was also evident in case studies of WUI residents by Shindler (2007) and Winter and Fried (2000), mitigation strategies that involve prescribed burning have generated substantial controversy among Kelowna residents, due to some residents' lack of trust in the ability of forestry officials to contain controlled burns once they have been set within the area's dry forests.

Several of the residents who emphasized the inherent value of forests expressed cynicism about the effectiveness of municipal government efforts towards community sustainability. Some voiced frustration about the perceived inaction by city council to preserve forested areas of the city, for example by allowing developers to continue with expanding development in places such as Knox Mountain Park. Two photos taken by participants (displayed in Figure 4.12, p. 122) demonstrate their concerns about development projects taking place in and around Kelowna. These images effectively relate the dramatic and extensive changes that result from these types of projects, as trees are removed to both facilitate the construction process and ensure fire safety, leaving

behind a rather bleak landscape. A significant source of distrust for some residents also stems from concerns that the implementation of provincial fuel management strategies is guided mainly by the commercial value of trees to be removed rather than benefits to overall forest health. Efforts already undertaken by B.C. Parks to address this issue as part of public awareness literature on the agency's website reflect their awareness of this tension.

Forestry and fire officials have also identified challenges to maintaining effective communication and trust-building across the community; as has been made evident throughout this study, it has often been a challenge for officials to build support for forest management and fire mitigation efforts in ways that sufficiently address the wide and often conflicting range of nature perspectives that exist among Kelowna area residents. For example, varied concerns were expressed among residents about forest fire mitigation strategies based on the types of fuel reduction methods that would be employed. While many interviewees who prioritize ecosystem health have stated that they do not support the implementation of mechanical tree thinning strategies, as they link the removal of vegetation to too large a degree of nutrient loss in affected forests, other residents who view forests as potentially hazardous areas voiced support for mechanical thinning over prescribed burns, citing concerns about smoke and the potential for fire spread that could result from controlled burning projects. Clearly, WUI residents may be required to accept a degree of compromise as participants in the development of disaster mitigation strategies that could address the varied needs of the entire community.

The main aspect of a participatory approach to disaster mitigation is that residents are perceived as contributors to the process rather than as an audience to already

established strategies. Government agencies involved with forest management and fire prevention in the Kelowna area have already begun to address issues of trust-building and communication with local residents. For example, the Parks Area Supervisor for B.C. Parks described how that agency has effectively worked with other forest stakeholders such as area recreation groups to incorporate community perspectives about fire management and forest restoration in provincial parks in the years before and after the Okanagan Mountain Park fire. Officials of other agencies expressed interest in this type of approach, but acknowledged that they have not yet implemented more inclusive processes for mitigation strategy development. Some of the potential benefits to this type of approach are outlined below.

Open discussion about proposed mitigation strategies can aid in establishing trust between forestry agencies and community residents prior to the implementation of potentially controversial measures for forest fuels management. The successful effort in generating local support for the prescribed burn at Kalamoir Regional Park was attributed by both the Parks Services Manager for the Regional District of Central Okanagan as well as some area residents to frequent and detailed opportunities for communication during open houses about the potential risks and benefits of the burn. This type of approach to soliciting feedback from residents who are particularly concerned about maintaining the integrity of area forests could reduce potential suspicion about perceived commercial logging practices as part of tree thinning efforts in provincial parks. To this end, the Parks Area Supervisor for the Kelowna area has noted that B.C. Parks is currently working to make more transparent to area residents the agency's practice of directing funds received from the sale of thinned trees solely

toward future restoration activities in park forests. Increased transparency and more effective public consultation could potentially serve to make the decision process regarding forest management and fire risk mitigation more inherently democratic.

Consultation with residents could guide the modification of existing risk reduction strategies in ways that simultaneously address residents' other forest management priorities. Prather et al. (2008) have suggested that an examination of forest ecosystems at a broader, landscape scale may reveal that there are many possibilities within the range of fuel thinning options available to fire mitigation practitioners to address residents' other concerns about forest management; as a result, multiple mitigation strategies could be implemented across this larger landscape in accordance with residents' nature perspectives as well as the unique features or requirements of each area of forest. Examples of mitigation strategies that could be generated from this type of approach include: a reduction in tree thinning within ecologically sensitive areas [as has been suggested by Dellasala et al. (2004), Kauffman (2004) and Prather et al (2008), and which has already been addressed as part of fire mitigation recommendations for the City of Kelowna]; the creation of complete fuel breaks within strategic areas adjacent to neighbourhoods that would cover a somewhat smaller area, rather than the implementation of extensive thinning within areas of forest that are most valued by area residents; the modification of mitigation strategies in provincial parks to minimize disruption to recreational spaces (as has already been partially addressed by B.C. Parks); and the reconfiguration of proposed residential developments in ways that would reduce the degree to which forested areas surrounding

these developments would be removed for disaster mitigation purposes (e.g. in places such as Knox Mountain Park).

Some of the additional concerns about mitigation strategies that were voiced by interview participants revealed that there are other issues to be considered by forest fire mitigation practitioners beyond the aesthetic qualities and inherent value of area forests; these include the reluctance of some residents to remove vegetation around their homes due to the shading benefits of adjacent trees (i.e. in helping to reduce household cooling energy), as well as residents' reluctance to convert landscaping to less flammable lawns or non-native species due to concerns about the increased water consumption required to maintain these modified areas. Through a more participatory process, residents could potentially provide insights into concerns about and alternative approaches to forest management that may not have been considered by agencies involved with fire mitigation.

The continuing development of community strategies for disaster mitigation is potentially enriched through a process of adaptive management that is based on evolving knowledge and ideas contributed from a range of perspectives and stakeholders. As Hull et al. (2000) point out, there may be many understandings of what constitutes the natural or preferred state of local landscapes within any community. Before any specific mitigation approaches have been finalized, a participatory approach to disaster mitigation planning provides an atmosphere within which communities may establish their own unique definitions for ecologically sustainable and fire safe forest management; these may be developed within a context in which residents draw from their

own experiences with forests to influence policies for the maintenance of surrounding natural areas.

A participatory approach involving other members of the community also provides an opportunity for forestry and other government agencies to reexamine their own assumptions and biases about appropriate strategies for forest management and disaster mitigation (assumptions that may have sometimes been influenced by somewhat conflicting scientific perspectives). Disaster mitigation practices have continued to evolve over the last century, influenced by increasingly sophisticated research methods as well as changing public attitudes towards forest ecosystem management. Today, uncertainty still exists within the scientific community, for instance, regarding past ecological factors such as the intensity and frequency of historical patterns of fire disturbance in Kelowna area forests; the full effects of future influences on forest fire behavior such as climate change, altered forest species compositions (i.e. resulting from the proliferation of invasive species), and rapidly expanding insect infestations are also unknown.

An approach to mitigation planning that incorporates other community perspectives recognizes residents as relevant and valuable sources of knowledge about area forests. For example, members of naturalist groups could potentially contribute additional information and ideas towards the integration of disaster mitigation and ecological sustainability goals, perhaps by identifying species at risk within area forests, or by providing other options regarding how local wildlife habitats could be preserved. The photos and accompanying comments provided by participants in Figures 4.9 and 4.10 (pp. 116-117) certainly demonstrate the awareness and preferences of these residents

regarding ecological issues such as habitat preservation and regrowth of native vegetative species following fire disturbance. Other residents' perspectives based on their emotional connections to area forests could be accorded the same degree of consideration in cases where natural landscapes especially valued by the community are at risk.

Most importantly, the inclusion of community members in the development of disaster mitigation strategies may ultimately encourage more support among residents for approaches that have been generated through this type of effort. This may be particularly effective in cases where points of connection between residents' differing perspectives are explored. For example, a participatory approach provides a more extensive forum for residents and government agencies to work out mitigation strategies that address controversial issues such as residents' concerns about property rights in the midst of pressure to alter their landscapes. This type of process could also potentially facilitate discussion and promote greater understanding between residents within the community who express conflicting views about how surrounding forests should be managed (for instance, between those in support of restrictions on fuel thinning in provincial park forests as part of the 'Class A' designation of these parks, and other residents who have attributed the loss of their homes to these types of restrictions). The discussion of these concerns on-site, through field tours of local forested areas [as suggested by Shindler (2007)], may enable varied stakeholders to more effectively communicate their ideas and concerns while providing increased insight into the visible effects of differing forest management strategies.

Conclusion

Vulnerability to disaster risk results from a complex mix of political, social, economic and ecological influences. In contrast to poorer socio-economic classes, who are so obviously constrained in their choices and who have been the subject of much of the disaster literature to date, there are many ways in which more prosperous socio-economic classes may voluntarily expose themselves to higher disaster risk in order to be close to the natural surroundings that they most value (as demonstrated by the proliferation of beachfront properties, mansions along fault lines, and homes at the urban-forest periphery in communities across North America). The residents of Kelowna, many of whom have been drawn to the appeal of the city's forested landscapes, must also accept that their homes are at risk of exposure to potentially large and damaging wildfires similar to those seen during the Okanagan Mountain Park fire of 2003. Despite aggressive suppression efforts on the part of provincial forestry agencies, forest fires will continue to impact WUI communities in the southern interior of British Columbia, resulting in part from the increasing expansion of settlements within the dry forested and fire-maintained ecosystems that are a part of this area of the province. This reality has already been demonstrated during the large fire events that occurred within areas north and west of Kelowna during the summer of 2009.

As part of efforts to reduce the risk that future fires will impact the community, there is an understandable sense of urgency on the part of Kelowna area forestry officials, who are simultaneously attempting to cope with the dramatic effects of the pine beetle infestation, to undertake fuel reduction efforts that they hope will also help to preserve

community forests. Amid challenges that include the continual regrowth of vegetation within area forests as well as substantial financial and personnel requirements, forestry agencies are reliant on community support for forest fire mitigation programs on public lands in addition to residents' individual efforts to reduce the density of vegetation on their own properties. In order to help promote these efforts and increase community input regarding mitigation actions in public forests in and around the city, mitigation agencies would benefit from a greater awareness of the varied perspectives of nature that influence residents' priorities for forest management and fire mitigation.

Each of the three social constructions of nature that were explored among Kelowna area residents provides valuable insights into their motivations to support or reject efforts to modify area forests. Among residents who expressed views from the 'forest as hazard' perspective, support for substantial tree removal or concern about particular mitigation methods was often based on fears for community safety that were associated with their experiences with the 2003 fire. The 'forest as aesthetically valuable' perspective was frequently associated with the reluctance by residents to reduce forest densities due to concerns about maintaining the forested character of individual properties, park recreation spaces, or the community as a whole. Lastly, residents who expressed preferences that corresponded with the 'forest as inherently valuable' view often judged mitigation efforts based on their degree of impact on overall forest health as well as the well-being of individual species of wildlife and vegetation.

An application of the awareness of these views to the development of participatory disaster mitigation strategies for the community requires that forestry and fire mitigation agencies determine multiple courses of action among the varied and valid range of

residents' nature perspectives. As Castree (2001: 17) acknowledges, "We must live with this inability to know nature 'as it really is,' while still remaining committed to the idea that some knowledges of, and practices on, nature are better or worse than others." This type of approach would educate residents about the existing risks and potentially multiple benefits associated with particular strategies for forest fire mitigation, and establish greater trust and increase communication with members of the community by incorporating into forest management and fire mitigation plans the opinions, ideas and knowledges about nature that are held by residents outside the range of expert discourses.

Future lines of inquiry into community plans for forest fire mitigation would benefit from a deeper examination of the perspectives of some of the other groups of Kelowna residents that were not focused on in this study. For example, gender issues surrounding residents' nature perspectives and reactions to mitigation policy could be explored, as well as community reactions based on residents' differing income levels and household types (e.g., through a fuller exploration of the influence of home rental vs. ownership on community safety perspectives). The influence of group discourses (i.e., community or naturalist groups) that originate from similar nature perspectives on the power to affect participatory forest fire mitigation processes would also form an important focus of future study, to supplement the influence of individual views on mitigation strategies that was emphasized through this research. Perhaps new insights could also be gained from exploring the potential for forest management and fire mitigation plans to be established over more extensive spatial scales; this could involve various communities working together to address the varied aspects and requirements of neighbouring and interconnected forested landscapes.

Community responses to the recommendations presented in this study highlight an opportunity for government officials and forestry experts in all North American WUI communities to present and develop hazard mitigation strategies in ways in which their motives are clearly communicated, and their methods are open to debate and discussion. While the perspectives of residents in each WUI community are unique, it appears that in general, community forest fire mitigation strategies would benefit from a balance of providing information to homeowners about the real risks of living at the wildlife-urban interface, and addressing residents' concerns about the health and aesthetic aspects of neighbouring forests. For the residents of these communities, their participation in the development of these strategies may allow them to more fully understand the varied safety, ecological and aesthetic implications of their actions (or inaction) towards the effective mitigation of forest fire hazard.

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Appendix A: Interview Script for Kelowna Residents

1. a. How long have you lived in Kelowna?
   b. Why did you move to Kelowna?

2. How many people live in your household? Do you have any children?

3. Do you plan to live in Kelowna indefinitely? Why or why not?

4. What do you like about Kelowna? Is there anything about the city that you find unappealing?

5. a. Have the natural features (such as forests) in the area within and surrounding Kelowna influenced your choice to move here/continue to live here?
   b. What are your impressions of the natural features (such as trees) on your own property? Is there anything that you particularly like or dislike about your landscape? Why?

6. a. Where were you when the Okanagan Mountain Park Fire reached its peak in Kelowna in 2003? Were you living in the city at the time?
   b. When the fires first broke out, did you feel that your home was at risk? Did your feelings change at all as time went on over the course of the fire (ie. did you feel more or less at risk as time went on)?
   c. Have your perceptions of risk to your city and/or your property from forest fire changed in any way since 2003?
   d. Do you think the 2003 fires have changed the way in which you experience/enjoy forested areas in Kelowna, and if so, can you briefly describe how?

7. a. Do you have any opinions about how forest fires were managed in the area prior to the Okanagan Mountain Park Fire?
   b. Do you have any opinions about how future large-scale forest fires in and around urban areas like Kelowna could be prevented?

8. a. Do you have any opinions about what strategies for sustainable forest management (both within provincial parks and within urban areas) should focus on?
   b. Do you think any limits should be imposed on development into forested areas in Kelowna? Why/why not?

9. Links have been drawn between previous policies of fire suppression and the magnitude of the pine beetle infestation in the interior of British Columbia. It has been suggested that the continued suppression of wildfires in B.C. forests has resulted in an increase in growth and occurrence of the lodgepole pine, which is a predominant species of tree used as a home for the mountain pine beetle. This

infestation in turn has created an abundance of dead trees which add significantly to the threat of wildfire in affected forests.

a. Do you agree with this assessment?
b. If not, why?
c. If so, does knowledge of this link have any influence on your opinions about sustainable forest management/forest fire management in the province?

10. As you may or may not be aware, the B.C. government initiated an investigation known as the *Firestorm 2003: Provincial Review* after the 2003 wildfires, to investigate concerns about forest management and forest fire emergency response in the province.

    In terms of forest management, the report states that previous policies of almost complete fire suppression in the province's forests have led to a buildup of fuel in the form of excess vegetation, which would normally have been removed through natural cycles of smaller-scale fires within these forests. It has been suggested that this buildup of fuel increases the risk of much larger and more damaging fires in these forested areas in the future.

    The review report makes several recommendations about revised approaches to forest management to reduce future fire risk. Some examples of recommendations from the report, as they would apply to areas in and around Kelowna, include:

    - The province should allow selective tree harvesting in provincial parks to reduce fuel buildup.
    - The province should establish strictly controlled conditions for using prescribed burning as a fuel management tool.

    a. Do you agree with the review's assessment that previous policies of fire suppression in B.C.'s forests are a significant cause of the Okanagan Mountain Park Fire? Why or why not?
    b. Do you support the recommended policy of selective tree removal in provincial parks? Why or why not?
    c. Where small-scale fires occur in areas surrounding Kelowna that have little risk of spreading to inhabited areas of the city, would you prefer that a consistent policy of complete suppression of fires be maintained, or would you be in support of allowing some fires to burn if they are closely monitored? Why?
    d. Is there any circumstance under which you would support a plan of prescribed burning within forested areas of the province that surround the city?

11. A report called *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* was presented to Kelowna municipal council in 2007. This independent review of land use policy within Kelowna recommended changes to some land use policies in order to increase community protection from wildfire.

Here are some of the recommendations contained in the report:

- Recommendation 9: The City should investigate the potential of partnering with residents to promote treatment of public lands adjacent to private property. Private land owners could be encouraged to not only clean their own yards of debris and brush but also to be responsible for the removal of debris and brush from public lands immediately adjacent to them to a depth of 20 metres. Removal of material would be coordinated with the spring yard waste pickup program.

- Recommendation 15: Many homes are built immediately adjacent to the forest edge. It is recommended that the City alter the Zoning Bylaw to require that developers leave building setbacks on private land so that there is a minimum distance of 10m between buildings and the forest interface. This standard should be applied to housing bordering both City owned and forested private land.

- Recommendation 18: Consistent with the standards developed for wildfire covenants, the City should adopt a standard for fuel management in parks and green spaces.

a. As suggested in Recommendation 9, would you be willing to contribute to the removal of excess vegetation from public lands adjacent to your property (if this condition applies)? Do you think other property owners under the conditions listed in this recommendation should be doing this? Why or why not?
b. Do you agree with the proposal contained in Recommendation 15, that trees should be removed from new developments in forested areas so that new buildings will be set back from the forest edge? Why or why not?
c. Do you support the implementation of selective tree removal projects in parks and other public spaces within the city? Why or why not?
d. Would you be willing to participate in any of these tree thinning projects? Why or why not?
e. Would you support prescribed burning measures as part of forest fire mitigation efforts in parks/public spaces in Kelowna? Why or why not?

12. The *Firestorm 2003 Provincial Review* and the *Review of Policies, Procedures and Bylaws Relating to Wildland Fire* both mention the *FireSmart: Protecting Your Community from Wildfire* manual.

This manual contains among other things a set of guidelines for residents to make changes to landscaping on their own properties in order to reduce the potential for

the spread of wildfire through their community. Here are some recommendations from the manual that would apply to landscaping within 10 metres of your home:

- Over mature, dead, and dying trees with the potential to ignite and carry fire should be removed.
- Owners are encouraged to convert remaining vegetation to less fire-prone species if consistent with ecological factors.
- Replace highly flammable species such as juniper or cedar adjacent to buildings with watered lawns and low-fuel-volume plants. Individual trees and shrubs may be kept, it this vegetation would not readily transmit fire to the building.
- Vegetation existing away from the immediate area of the building should be thinned and pruned to prevent a fire from being carried toward or away from the building.

a. Would you be willing to remove trees from your property in order to comply with the *FireSmart* recommendations for reduced risk from wildfire? Is there a particular area of vegetation on your property that you would not remove even if recommended? Why or why not?
b. Would you be willing to convert vegetation on your property to more fire-resistant species (ie. conversion to lower-flammability conifers, or replacement of conifers with deciduous trees)? Why or why not?

13. a. Are you aware of any public education programs or community meetings currently in place that address measures to reduce the risk of future forest fires within the city? If so, do you think these programs address all of your concerns about forest fire risk and prevention?
    b. Do you have any opinions about how public education programs could be improved?

14. Is there anything else you'd like to add to this discussion today?

Appendix B: Interview Script for Government Officials

1. How long have you held the position of (*title of position*) for (*agency*)?

2. What geographical area of urban forest does your office maintain? Does this area consist mainly of forests within city limits, or are any surrounding areas included?

3. Can you briefly describe the types of projects that are implemented within your department, particularly any projects that are a part of forest fire mitigation strategies?

4. Approximately how many projects that involve the reduction of forest fuels on public lands within the city (mechanical thinning, prescribed burning) been carried out since 2003? Can you describe the areas where they have been implemented?

5. Have any Kelowna residents contacted your office to voice their support or concern for these fuel reduction projects?

6. Has your office worked with any other communities across the country, with the provincial government, or with the federal government in the development of urban forestry strategies for the City of Kelowna?

7. Has your office actively worked with any members of your community in developing urban forestry strategies, and if so, can you describe the ways in which the community is involved?

8. a) Have any Kelowna residents made suggestions for alternate strategies about ecological sustainability, forest maintenance or forest fire mitigation goals?
   b) Could you or anyone else in your office provide any information on these comments?

9. Have you received any volunteer assistance from Kelowna residents, as part of any fuel reduction projects in forests within and surrounding the city, and if so, can you provide any information on the nature of the assistance? Has this involved any neighbourhood organizations or naturalist groups?

10. Are you aware of any fuel reduction measures that are being undertaken by residents on their own private properties, and are you aware of the extent to which any residents are following FireSmart guidelines for removal of vegetation? (*landscaping within 10 metres of their homes...*)

    - Over mature, dead, and dying trees with the potential to ignite and carry fire should be removed.
    - Owners are encouraged to convert remaining vegetation to less fire-prone species if consistent with ecological factors.
    - Replace highly flammable species such as juniper or cedar adjacent to buildings with watered lawns and low-fuel-volume plants. Individual trees and shrubs may be kept, it this vegetation would not readily transmit fire to the building.
    - Vegetation existing away from the immediate area of the building should be thinned and pruned to prevent a fire from being carried toward or away from the building.

11. Are you aware of any public education programs that are in place in Kelowna regarding the alteration of vegetation on private properties as part of forest fire mitigation strategies, and if so, can you briefly describe the extent of these education programs?

12. Has the threat of infestation from the pine beetle required any adjustments to your forest maintenance or fire mitigation strategies, and if so, how?

13. What is your general impression of the community response to forest management and fuel reduction projects in forests in and around Kelowna, and why?

14. In your opinion, have the majority of residents expressed support or concern for fuel reduction projects?

15. Do you have any opinions about how public education programs, levels of community involvement, or fuel reduction strategies in general could be improved?

16. Does your office have any contact information for residents who have participated in fuel reduction projects, or for residents who have expressed support or concern about these projects?

17. Do you have anything else you'd like to add today about the issue of forest fire mitigation in and around Kelowna?

Appendix C: Instructions to Participants for Photography Exercise

Dear Participant,

Thank you very much for your participation in this research project. With the camera provided, please take photos of natural landscape features (such as treed areas) in one or all of the following areas: on your own property, within Kelowna, and in rural areas (e.g., provincial parks, vineyards) immediately surrounding the city. While you may include images of yourself in the photos if you wish, please do not take photographs of any persons who have not provided written consent to having their photograph taken. Ideally, the photos should capture aspects of your natural surroundings that you find appealing and/or have a personal connection to, as well as aspects that are not appealing to you. During the process of taking the photos, please write a brief (1-2 paragraphs) description of what you've chosen to document in each photo, and why you find it either appealing or unappealing.

Please return this camera in the postage-paid, mail-back envelope that is provided with this kit no later than October 31, 2008. You may withdraw from this study at any time before, during or after participation in this exercise. At any time before completion of the research report, any photo taken by you as part of this research exercise will be removed from the study and returned to you upon your request. There is no cost or financial benefit to you as a participant in this study.

If you have any questions about this photography exercise or the research project, please contact Magda Goemans at (*phone number*) or at (*email address*).