BURNING QUESTIONS: EXAMINING THE ROLE OF THE GEOWEB IN UNDERSTANDING THE HUMAN IMPACTS OF THE OKANAGAN MOUNTAIN PARK FIRE

by

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Abstract

As online technologies evolve, the potential of the Geospatial Web (or Geoweb) to harness the collective knowledge of the general public is beginning to be realized. Using the Geoweb, people can volunteer their geographic information related to their own experiences to enable increased knowledge dissemination and give their fading memory some permanence. In the case of the 2003 Okanagan Mountain Park Fire, a 25,000-hectare forest fire that burned 238 homes and led to the evacuation of almost 30,000 people, these memories need to be captured soon or they will be forgotten. Collaborating with the Kelowna Fire Museum and Education Centre, this project follows the creation of an online participatory map capable of displaying each day of the fire in a stimulating and interactive way. It allows participants to better understand both the fire itself and the wide range of experiences and impacts by allowing participants to contribute their own information, whether photographs, videos, or text, and to comment on the contributions of others. Aside from the practical application of the tool, this community-based participatory research examines influences on an individual's willingness to volunteer geographic experiences related to the Okanagan Mountain Park fire through participant observation and six unstructured interview-workshops. Results examine participant engagement in terms of passive or active map use, perspectives of participants-as-experts and broader themes of whether the tool can educate and preserve information about this event for the museum. Results demonstrate that while the mapping tool allows users to engage with the spatial and cultural implications of the fire in an interactive way, it is difficult to encourage passive users to actively add points or discussions to the map. Although designed to be highly case-specific, the research raises broader questions about 'expert-ness' in participatory mapping and participation, which are applicable at a much broader level. Ultimately, this research considers the future of this tool and similar tools and whether volunteered geographic information works.

Preface

This research required ethics approval and fully adhered to the procedures of the University of British Columbia Okanagan Behavioural Research Ethics Board, certificate number H11-00249.

This community-based participatory research project was undertaken with contributions from Kelowna Fire Museum and Education Centre, the community partner during this research. Although they did not contribute to the text, members of the society did contribute ideas and feedback throughout the research project. Because many decisions were made as a research team, the use of 'we' in this thesis indicates decisions made that included my supervisor, members from the museum, and myself.

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1.   Introduction

Increasingly, online technologies enable members of the public, and not only experts, to express their insights into a place, event, or time. Core aspects of Geographic Information Systems (GIS) have been simplified to such an extent that it is now possible for non-experts to participate in the map making process, thus unlocking their vast, and often untapped, knowledge. The Geospatial Web (or Geoweb) allows people to participate in large-scale gathering and sharing of volunteered geographic information (VGI). This thesis describes how a community of ordinary people was able to use the Geoweb to collaborate through a mapping project and discusses how it could enhance our understanding of forest fire impacts in the Okanagan.

Early online technologies were expert created and information traveled primarily in one direction, from producers of information to consumers. However, recent technological innovations allow information to be multi-directional; consumers of information have now become producers and are collaborating to solve real-world problems and share their knowledge (Sui 2008). This innovation is known as Web 2.0, differentiating it from the unidirectional Web 1.0   (Goodchild 2007a). Through citizen science, people can make observations and contribute these scientific databases (Lukyanenko et al. 2011); they can also contribute qualitative opinions and experiences to what Goodchild (2007b) calls a 'patchwork' of volunteered geographic information. These online databases assume that all users are experts, have knowledge to contribute (especially in their own environment), and that amateurs and experts can come together to create reliable information sources. An example of this 'wikification' process (Sui 2008) is Wikipedia, where a full encyclopedia has been created through online collaboration. The emergence of Web 2.0 geographic tools is now referred to as the Geospatial web (or Geoweb). It is increasingly being credited with introducing place into the space-less online realm and linking information to location by geotagging (Haklay et al. 2008; Turner 2006).

The most important enabling factors behind volunteered geographic information are the individuals who contribute the information. Goodchild (2007b) considers people, with their senses and life experience interpreting the world, to be a potentially useful, yet

highly underutilized resource especially in regards to digital map making. The Geoweb enables citizens to not just see but also to interpret the world around them. Through these tools, it is possible for ordinary citizens to demonstrate a multiplicity of ways to understand the world. This volunteered geographic information has allowed for a vast online world that has answered millions of questions by asking not experts, but ordinary people (O'Reilly 2005). Neogeographers, 'mashups', and 'patchworks' are pioneering new ways of telling a story that is situated in a specific location and mapping relationships between people and their environment (Batty et al. 2010; Hudson-Smith et al 2009; Turner 2006).

Despite its clear potential, the field of neogeography faces a number of ethical and practical challenges. Critics of VGI point to the digital divide (inequities in Internet and computer access) and question the potential for exclusion (Chakraborty & Bosman 2005). Despite striving to include everyone, relying on technology that not everyone has access to can actually decrease the range of users and work against the goals of the Geoweb (Sui 2008). Neogeographers also point to the potential misuse of data (Elwood 2008; Goodchild 2008; Norris 2001; Sui 2008) and lack of trust and authority of online sources (boyd & Ellison 2008; Flanagin & Metzger 2008; Grira & Bédard 2009) as potential trouble areas as the field begins to assert itself. Because of many past frivolous uses of the technology and the discipline's reliance on other fields within geography for theoretical grounding, Goodchild (2008) and others question the seriousness and independence of neogeography. Most importantly, some scholars cite difficulties in organizing and verifying publicly volunteered data (Elwood 2008; Flanagin & Metzger 2008). As desirable as a bottom-up approach without gatekeepers may be, there are far too few organizational systems in this model. Until a coherent system of verifying and cataloguing information is developed, users will struggle to find data (Elwood 2008). However, designing an organizational system that avoids authoritarianism presents challenges. Despite these concerns, VGI shows considerable promise in making new connections between people and place, particularly in a local context where it can allow community members to put themselves onto the map, participate on their own terms, and express multiple perspectives (Elwood 2008). Mapping tools are being developed and adapted to ensure that the ideal formula for each project or group can be reached. We can

use these tools to create digital records of human observations and experiences to form patchworks from entire networks of contributors.

The Geoweb's ability to demonstrate the remarkable and varied experiences of individuals has been applied to the context of forest fires in the Okanagan, a highly at-risk area for forest fires. This research was guided by a pilot project which tested the viability of a website that could track forest fires temporally and spatially and could be visually appealing and interesting to the public. This map was created using Geolive, open-source software that uses the Google Maps' API. Geolive enables users to extensively customize the online map and in this case allowed us to add a timeline and overlays of fire burn perimeters. Surveys were conducted and found that the map succeeded in visually representing forest fire burn areas in an accessible and engaging way. While the overall technical concept was successful, there were issues of browser preference, computer skill, and software that surfaced. This pilot study established that there is a fine line between ease of use and functionality. Based on these results, we decided to narrow the research to one forest fire and focused on the Okanagan Mountain Park Fire.

The 2003 Okanagan Mountain Park Fire was an interface forest fire that covered over 25,000 hectares, burned 238 homes and led to the evacuation of more than 30,000 people (Wildfire Management Branch 2011). This event represents a major historical marker in the Okanagan area and was experienced uniquely by those involved, whether firefighters, volunteers, families, or evacuees. Although local media provided residents with the specific evacuation and status information they needed, and national media showed dramatic coverage as the fire unfolded, there were few opportunities for the public to contribute their own experiences and reflections. New technologies are increasingly supporting the production and dissemination of hyperlocal media, where the lines blur between reader and reporter as members of the general public contribute stories, photographs or information (Gillette et al. 2007; Kurpius et al. 2010; Metzgar et al. 2011; Schaffer 2007). By combining this idea of hyperlocal media and self-reporting with volunteered geographic information and the Geoweb it enabled new types of participation through mapping. We sought to create a mapping tool that would facilitate the dissemination of hyperlocal knowledge, working with members of the community to

recreate their experiences during the Okanagan Mountain Park fire. From the pilot project we understood that community involvement was key and that the project had to be seen as being more than a merely academic pursuit. Fortunately, through the national media coverage the pilot study received, the Kelowna Fire Museum and Education Centre contacted us about developing a partnership. Together we built a research plan that sought to develop and implement a Geoweb mapping tool called Fire History (http://www.firehistory.ok.ubc.ca) that allowed members of the public to share and reflect on their experiences of the Okanagan Mountain Park Fire, and leave a record of what this fire meant to them for their community. The map was developed to show the day-by-day spread of the fire and also allows participants to add photographs, videos, or text to express their experiences over the three-week span of the fire. The research question for this study asks:

> *What factors can influence an individual's willingness to volunteer their geographic information related to the Okanagan Mountain Park Fire?*

To test the viability of this Fire History website and explain what factors influence user participation we employed a community based participatory research approach. Through this partnership we engaged six participants, all of whom were affected by the Okanagan Mountain Park Fire yet came from varying backgrounds with different life experiences. From the beginning, the research sought to be as collaborative as possible, soliciting feedback on the map, research design, and research participant sampling from our partner. Relationships were an essential part of the research both within the research team and between the interviewer and participants. The research was designed to encourage multiple voices and meanings, ensuring that each person's story was valued. Because of the highly personal and emotional nature of many people's experiences, we adopted a qualitative approach, encouraging people to discuss their memories regarding the fire and to reflect on whether this tool could help them express these experiences. Through unstructured interview-workshops participants were able to view the map and add their own information. During this process, our discussion would ask three types of questions concerning: how the individual had been affected by the fire, their general opinions and ideas about the online mapping tool and, broader questions about what affected their willingness to participate.

This chapter provides an overview of the themes and ideas relevant to the research. Next, Chapter 2 elaborates on these themes, presents the forest fire itself, the media, and other modes of understanding. It also discusses the development of volunteered geographic information within the literature. Chapter 3 describes the pilot project, which provided much of the guidance for the study, leading into the methods and broader research themes in Chapter 4. This chapter also examines the relationship with the Kelowna Fire Museum & Education Centre, the partner for this research, and discusses potential ethical issues. Chapter 5 goes into depth on the results of my research interviews, generating main themes and discussion. Finally, Chapter 6 summarizes the findings and offers recommendations for future projects.

# 2.	Literature Review

## 2.1	Study area

The Okanagan Valley is located in the Southern Interior of British Columbia, stretching from the Shuswap in the north to the Columbia River in Washington State in the south. The region has a semi-arid continental Köppen-Geiger climate classification, receiving limited precipitation due to rain shadow from the Cascade Mountains (Kottek et al. 2006; de Scally and Turchak 1998). In the Central Okanagan, the city of Kelowna receives an average of 298mm of precipitation annually, much less than the Vancouver region which receives at least 1500mm annually (Environment Canada 2012). As of 2011, the population of the Central Okanagan was 182,756 and growing rapidly (Statistics Canada 2012). Kelowna is the largest urban area and the focus of this region, marketed for its sophisticated lifestyle of wine and summer. Residents choose Kelowna for a specific sense of place – one that can combine a rural feeling of Ponderosa Pine forests and clear lakes with the convenience of being close to amenities. This makes interface zones – areas where forest meet urban and suburban development – particularly desirable. The combined effect of this dry climate and increased human activity in interface zones results in a high, and steadily increasing, risk of forest fires.

Prior to 2003, campaigns to eliminate forest fires have been successful in British Columbia, with helicopters, water bombers and ground crews working to contain and eliminate fires before they expanded beyond manageable sizes. However in a natural forest system, fires are a regular and necessary natural process to clear deadwood and unwanted brush, refreshing the forest system. Preventing burns has led to buildups of fuel on forest floors – increasing the risk of a major fire (Freake & Plant 2004). After decades of suppression, a fire has a far greater potential to be devastating; both to the forest and to these interface populations. With the right conditions of heat and drought, a spark can launch a firestorm.

The summer of 2003 was one of the hottest on record province-wide, with extended droughts in the southern half of the province. Kelowna, for example, went a record breaking 44 days without precipitation with temperatures as high as 10 degrees

above normal (Brown 2003). These conditions created a fire season where fires "were the biggest, the most intense, the most expensive, and the most devastating wildfires in British Columbia's recorded history" (Filmon 2004, p.19). Over the summer, nearly 2,500 fires ignited, putting pressure on resources and making some fires almost impossible to suppress. Fires quickly increased in scale and intensity, crossing firebreaks and threatening communities (Wildfire Management Branch 2011). One particularly threatening fire was the McLure-Barriere fire, which damaged or destroyed 81 structures and caused almost 4,000 people to be evacuated (Probë 2003). The most major however, was the Okanagan Mountain Park Fire, which caused the largest evacuation in BC history, involving more than 30,000 people and burning 238 homes in Kelowna. In this firestorm summer of 2003, 7,600 firefighters were activated, almost 10,000 soldiers were brought in as part of Operation Peregrine, 265,000 hectares were burnt, and $375 million was spent on firefighting, a season still not matched almost a decade later (Brown 2003, p.79).

2.2   Okanagan Mountain Park Fire 2003

The Okanagan Mountain Park is a large provincial park stretching from the shore of Lake Okanagan to the top of Okanagan Mountain that backs onto several Kelowna suburban developments and neighbourhoods (Figure 2.2). On August 16th, 2003 lightning struck near the lakeshore. It was immediately reported and provincial fire crews were dispatched.
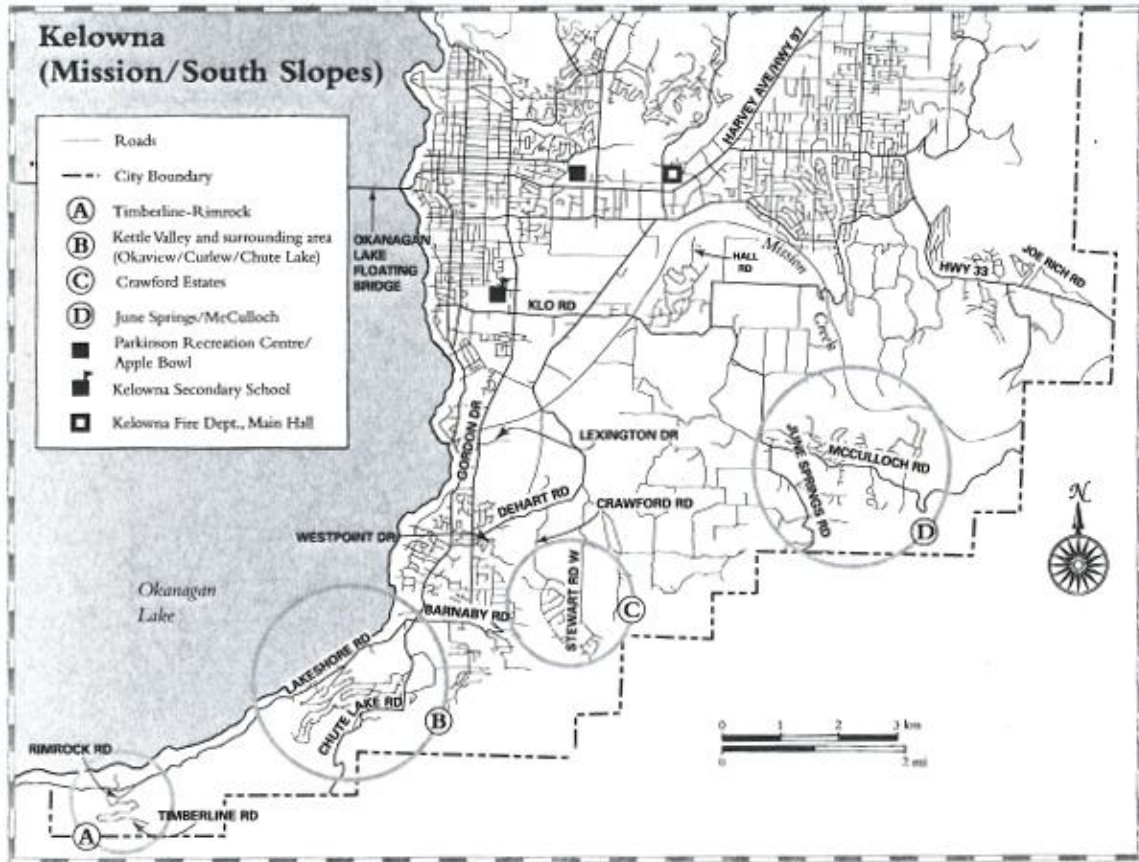
Figure 2.1: Kelowna (Mission/South Slopes)
Reprinted with permission from Freake & Plant (2004)

From that lightning strike, strong winds and warm weather aided the fire as it expanded south towards the community of Naramata. A shift in winds then sent the fire back towards Kelowna. Personnel scrambled to construct a 17-kilometer firebreak to protect the city. Evacuation alerts were given, instructing residents to be ready to leave in minutes; as the fire approached these alerts became evacuation orders. "Families loaded up a few clothes, and their most cherished possessions, usually photo albums and family mementos. A steady but orderly cavalcade of vehicles streamed out of the residential areas" (Wyatt 2003, p.20). Evacuees headed to one of two Reception Centres set up by Emergency Social Services volunteers. There, evacuees were signed in and lodging and food were organized. As the fire grew in size, "some residents who had previously opened their doors to provide evacuees with a place to stay are now being evacuated themselves, along with guests" (Brown 2003, p.13). The night of August 21st the fire jumped the break and burnt 15 homes. Politicians arrived and Canadian Armed Forces were dispatched to assist (Brown 2003).

As the fire neared several large subdivisions, witnesses describe the siege-like atmosphere: the blanket of smoke over the city, sitting in a hotel room listening to news updates, or staying at home waiting for an evacuation notice. By 8pm of what would be known as Black Friday or Firestorm Friday, almost one third of Kelowna was evacuated (approx. 30,000 evacuees). For the public, it was a waiting game, for others, it was chaos. Kelowna Fire Chief Gerry Zimmerman explains in Freake and Plant (2004):

> *The guys were seeing walls of flames 200 to 400 feet high. At the height of it, the winds were 130 to 140 kilometres an hour. They saw small tornadoes picking off the houses…. Temperatures in the forested area were between 800 and 1,000 degrees Celsius. Once it hit the houses, the temperatures were as high as 2,000 degrees. Men said houses were disintegrating in front of them. The fire would incinerate a white plastic lawn chair without leaving a puddle of melted plastic. Only the white colouring was left on the ground, like a full-sized shadow of the chair. The grass underneath it was still green. It was something we didn't understand*
> (p.114).

Many firefighters said that they thought they were going to die (Anderson & Culbert 2003) and had to make some very difficult decisions to save some houses at the expense of others; "three city firefighters lost their houses that night, but worked anyway" (Freake & Plant 2003, p.62). In the end, there were over 200 homes lost that night in the Crawford, Okaview, Crestview, Curlew, Chute Lake, and Kettle Valley areas (Figure 2.2).

Because of the fire departments' policy of 'complete media co-operation', the public knew almost instantly details about the losses from the previous night. "Saturday morning we woke up to newspaper headlines 'Houses Burning... hundreds possibly destroyed', '30,000 people evacuated', 'War Zone', 'Kelowna wildfire incinerates more than 200 homes'. We were glued to the TV, radio and internet" (Brown 2003, p.56). City workers had the task of assessing losses so that the homeowners could be informed quickly. Sunday August 23rd, residents were brought back home by neighbourhood and told whether their home had burned or still stood. Officials later praised how well this meeting was handled (Filmon 2004). Before residents were allowed back, those who had lost homes were taken on a bus tour of the area to see the devastation. It was an

emotional experience for residents. During this week most of the evacuation orders were lifted and many thought that the fire had run its course. Dozens of community groups began fundraising, selling T-shirts, ribbons, hats and lemonade. Those who had lost homes arranged a place to stay, filed insurance claims, and began to deal with their loss.

However, on Thursday August 28th, the erratic fire behaviour returned as the fire spread along Bellevue Creek into Myra Canyon Provincial Park and the Kettle Valley Railway. Recently restored and almost a century old, the Kettle Valley Railway was a popular tourist attraction for its historical value and natural beauty (Doeksen 1995; Hill 1989; Sanford 2002; Sanford 2003). In January 2003 it had been declared a National Historic Site (Anderson & Culbert 2003). With the fire approaching, the concern was for the wooden trestles coated in creosote − a highly flammable substance that is difficult to extinguish. Ultimately, 12 of 18 trestles were destroyed with 2 more heavily damaged. Another 4,200 people were evacuated and it looked as though the fire was making another run towards Kelowna. As everyone held their breath for another round of burning suburbs, the weather finally cooled.

By September 9th, the fire was 65 percent contained; by the 13th it was 90 percent. Not until September 14th was the province-wide state of emergency lifted and the Canadian Armed Forces sent home, leaving the task of cleaning up.

In the aftermath of the Okanagan Mountain Park Fire a number of firefighters were diagnosed with critical incident stress. One Kelowna firefighter says: "if it was a city block, we're trained for that. But how the hell do you train for something that's five miles long and moving 100 metres a minute?" (Anderson & Culbert 2003, p.68). Many of those on or near the front lines struggled with psychological trauma. For weeks, "the war mentality pervaded the city" (Freake & Plant 2004, p.95). Evacuated homeowners were "profoundly grateful, even a little guilty, that they had homes to return to" (Freake & Plant 2004, p.vii). Those who had lost their homes or businesses had their own losses to come to terms with. Also, the several million dollars in tourism revenue from the Kettle Valley Railway was lost. "The flames of the Okanagan Mountain Park Fire had barely died down before the criticism and second-guessing by the public began" (Wyatt 2003, p.53). For this, Gary Filmon was appointed to uncover what worked and what did not all across B.C. (Filmon 2004). The fire burned 25,600 hectares, half of which was parkland,

as well as 238 homes. It caused the evacuation of 27,050 people plus another 4,050 who were evacuated multiple times (Freake & Plant 2003). As Wyatt (2003) writes, "hardly a person in the Okanagan hasn't had their lives touched by forest fires this summer" (p.53).

However, this experience also proved the resolve of the community. People came together, volunteering their time, billeting evacuees, caring for animals and donating funds and goods. "Tons of food, clothing, and other goods have been pouring into Kelowna - the tangible evidence of generosity and sympathy for those who have lost all their possessions" (Wyatt 2003, p.48). Before the fire was even under control, fundraising efforts had already begun to restore the communities and people affected.

Although the media was present throughout, recording everything as it happened, there were still many stories and personal experiences that were missed. Those who were passed over by the media missed a chance to share their own stories, since it was generally these people who were also asked to contribute to the numerous community published books about the event (Anderson & Culbert 2003; Brown 2003; Freake & Plant 2003; Freake & Plant 2004; Lycar 2003; Turnbull et al. 2004; Wyatt 2003). It was an event that everyone in the community experienced, yet in different ways. For some, the memory will remain one of community spirit, for others one of loss or fear. For many, those three weeks in 2003 represent the best and the worst of Kelowna and needs to be remembered. As Fire Chief Zimmermann stated in Freake & Plant (2004):

> *We lived through history. It was a good part of history because we didn't lose anybody and we saw positive things come out of it. The community and our department are stronger than they've ever been. We had a whole country watching us and we were doing the right things. To be part of that was pretty special* (120).

2.3   Media evaluation

During the Okanagan Mountain Park Fire media served the dual purpose of informing a distant audience while keeping a local population apprised of the rapidly changing situation. Television, radio, print and the Internet informed people of evacuation notices, where the fire was, and what to expect (Freake & Plant 2004). Stations from all over the country came in to report, and generally I found that the further away they got from Kelowna, the more exaggerated and less accurate the reports. Indeed,

there is a whole body of media theory devoted to disaster media and the business of turning disasters into marketable news. This will be discussed in more detail below.

Although widely considered as inherently negative for almost the past century, forest fires have not always been perceived this way. Indigenous populations understood fire as a key part in the cycle of re-growth and renewal (Kimmerer & Lake 2001; Williams 2000), an idea that since the 1990's has begun resurgence within agencies like Parks Canada. It was with the arrival of settlers, that a more negative view of forest fires was established; this perspective continues today with many members of the general public. Through the settler's lens, fire risks lives, property, and resources as well as threatening social values like sense of place and sense and belonging. Ironically, while living on the edge of forested areas provides an idyllic 'sense of place' to many people, these are the areas most threatened by fire (Cheng & Becker 2005; Cortner et al. 1990). Throughout North America fire suppression campaigns began during the 1960s and 1970s and were supported by the highly successful Smokey the Bear ads, which used patriotism, the imagery of loss and fear to create anti-forest fire propaganda-type posters and advertisements (Donovan & Brown 2007; Jacobson et al. 2001). To this day prescribed burns – increasingly recognized as an important part of forest health – continue to promote feelings of discomfort and are avoided close to populated areas (Cortner et al. 1990). In the Okanagan, this avoidance of prescribed burning allowed a large build-up of material adjacent to the City of Kelowna. This set the stage for this massive conflagration.

During a disaster or hazard, the media serves as the public's primary source of information, and can actively influence public opinion, shaping how the story is presented. Although presented as factual, media is a construct created through a lens that is designed to tell a specific type of story. Disaster media studies explain how reporting on these risks can be sensationalised, exaggerated, formulaic and even disingenuous (Fischer 1998; Reid 1989; Benthall 1993).

Most disaster media scholars agree that media is biased yet disagree to what degree they are and how this bias can sensationalise the news (Freudenburg et al. 1996; Gentzkow & Shapiro 2006). The media chooses what to cover, generally favouring sudden events over slow-onset disasters (Eisensee & Strömberg 2007). It chooses what

areas to cover: a disaster in the developed world 'matters' far more than one in a distant underdeveloped nation (Adams 1986; Eisensee & Strömberg 2007). Media also features the stories of greatest property destruction and casualties (Fischer 1998). Also, in an effort to fit all the news into an article without overwhelming the public, complex events are increasingly being 'bite-sized'; collapsed down until the resulting story can become misleading in its simplicity. Sloganeering (Alexander 2000) is the result, using one punchy quote to sum up an entire situation, denying the readers the opportunity to evaluate news for themselves. Singer and Endreny (1993) write about a blurring distinction between entertainment and news. As media corporations continue to merge into massive conglomerates, the process becomes even more about motivated by and less about reporting the facts (Bagdikian 2004). Finally, with the fast pace of media, reporters often publish misleading information, use preliminary estimates instead of waiting for final counts, and miss out on talking to key people (Freudenburg et al. 1996).

Another key area of discussion in disaster media literature concerns the idea of a 'disaster mythology' (Fischer 1998; Gist & Lubin 1999; Masel-Walters et al. 1993; Singer & Endreny 1993; Tierney et al. 2006). The disaster mythology offers a template that reporters follow when reporting on disasters, whether hurricanes, tornadoes, nuclear disasters, or floods. The disaster mythology is typified by vivid and sensational stories and includes graphic images of the disaster and the human reaction to it, typically focusing on the darker aspects like looting, rioting, homelessness, long-term psychological damage, and despair. This type of reporting often fails to demonstrate the resilience of communities, the spirit, and many of the more positive responses and outcomes. The accuracy and quality of reporting is often limited, especially further away from the disaster, where stories change from factual to entertaining. For the most part, disasters and the human reaction to them are less exciting than the media makes it out to be and responses are much more practical. In the interest of time, entertainment, and sales, media retell, reinterpret, and represent stories through their specific lens. This disaster myth has become such a staple of media that few people recognize it, even the journalists creating it. Its use by the public, media, and officials reinforces the mythology as everyone makes their disaster fit the model. However, research has shown that disasters often fail to follow this pattern and therefore disaster events are skewed to fit a

predetermined idea or story (Fischer 1998; Tierney et al 2006). During the 2003 forest fires, there were many journalists who came in knowing exactly the type of story they wanted to write. A local author during the 2003 McLure-Barriere fire (another major fire in 2003 to the north) describes going in past the roadblocks with the intention to build a particular, pre-determined type of story (Freake & Plant 2004).

However, while these studies seem to discredit media, it is also important to note that they overemphasize international media and fail to recognize the value of local media during disasters. While some stories are exaggerated, these are generally for a more distant audience rather than a local audience. Local news provides the information evacuees need to know, and in the case of the Okanagan Mountain Park Fire, this was the case. Arguably, the most useful information was posted near-real time on the "Fire Watch" page of local online news outlet http://www.castanet.net/. Certainly Canada-wide, and even provincial news outlets place less emphasis on accuracy and more on telling a dramatic story, but local publications understand that they are providing a public service in times of disaster.

Media also serves a valuable service in asserting the importance of a problem and communicating the disaster victims' immediate needs. The relationship between media coverage and aid has been studied in depth (Alexander 2000; Benthall 1993; Eisensee & Strömberg 2007; Newton 1999). News coverage can help generate support; one family explained how difficult it was to tell their four year old that his toys were gone, however support poured in, "complete strangers called and reached out to us because they'd seen us in the news" (Freake & Plant 2004, p.181).

During the 2003 forest fire season the media depictions of the Okanagan Mountain Park Fire were some of the most factual and informative, particularly compared to accounts of the McLure-Barriere fire, another large interface fire that burned that summer. Both were areas with thousands of evacuees, massive fires and loss of infrastructure, yet they had very different media management schemes. During the Mclure-Barriere fire, organization was poor, communication was poor, and access to many areas was completely cut off. Evacuees and journalists had very little idea of what was happening close to the fire and many resorted to sneaking into evacuated zones. The news stories from this fire were more likely to be fabricated, over-general or fatalistic

with officials saying very little (Freake & Plant 2004). At the outbreak of the Okanagan Mountain Park Fire, "Chief Zimmermann realized how frustrated homeowners in the North Thompson became when officials withheld information from the media and stonewalled residents. He would disclose which houses were destroyed and give journalists new fire information as soon as it was available" (Freake & Plant 2004, p.99). In Kelowna, the media were invited into the fire hall and given access to interview homeowners, officials, and selected firefighters. They were also given daily press conferences where they were told precisely what was going on. As Zimmermann later reported, "many people told me the town would shut down when we did our 11:00 a.m. press conferences" (Freake & Plant 2004, pp.117-118). This relationship between journalists and officials kept information flowing and resulted in far better disaster reporting (Freake & Plant 2004).

Although sensational disaster mythology reporting did occur during the Okanagan Mountain Park fire, it was minimal and was often quickly refuted. For example, while some articles in larger newspapers and publications during the fire reported crazed evacuations (Clarke 2002), the books and reports published afterwards attested with pride to a calm and rational evacuation process (Freake & Plant 2004). In Freake and Plant (2004) one contributor noted: "Despite the gridlock, drivers were gracious and allowed merging vehicles to cut in. Kelowna may have been burning but people didn't forget their manners" (p.163). Another said, "It was so Canadian. It wasn't the time to panic or be selfish" (p.191). Almost all of the 30,000 evacuees over the course of the fire had access to hotel accommodation and meals. At disaster centres the atmosphere was calm, supportive, and efficient, with volunteers processing evacuees based on their needs and getting them on their way in well under an hour (Freake & Plant 2004). Greeters offered refreshments and led evacuees where they needed to be. Once the adrenaline faded and the immediate danger was over, coverage began to fade as well, with bigger networks pulling out leaving local media to report on the after effects: specifically the rebuilding, the critical-incident stress, the counseling, and the positive pulling together of community.

Issues of scale clearly exist in how media reported on the Okanagan Mountain Park forest fire, with accuracy and style of reporting varying considerably between the

community and local newspapers and the more distant provincial and national outlets. As Jacobson et al. (2001) write, "as physical distance from a hazard increases, the public also may be subject to more bias from mass media" (p.930). During the Okanagan Mountain Park Fire, news providers succeeded in keeping the affected population informed. However, it was not the provincial newspapers and national mass media outlets that people found most reliable. The most cited sources of information for residents were local sources with offices in Kelowna such as the Daily Courier (print), CHBC (television), and Castanet.net (Internet). Expanding outward from these local sources the accuracy of news decreased, becoming more geared towards entertainment. Mass media demonstrated limited scope, with reporters flown in to get a story quickly and leave, lacking the local knowledge, context, and experience. As a result they missed opportunities to speak with more people. Part of this loss was because many of those involved were often busy (as was the case for the volunteers, firefighters, and other personnel), or were difficult to access (like the soldiers or provincial wildfire fighters). Although the charismatic fire chief Gerry Zimmermann did a thorough job of informing and continually updating the media, there were others who may have benefitted from the chance to share their stories to present a more comprehensive view. Especially after the fire when the trauma finally hit, "Trauma brings out deeper issues in people's lives - the loss of family or relationships. They want to talk. It made us feel better because we were of use" (Freake & Plant 2004, p.170). This makes me wonder whether more self-reporting might have been possible, allowing people to unburden themselves soon after the fire and share their own experiences.

Indeed, allowing a broader audience to access and report news is at the centre of experimentation with new forms of online media. Taking advantage of online technologies, there are new ways of collecting and disseminating news and information at an extremely local level, dubbed 'hyperlocal media', which allow greater participation and engagement with information at a community level (Kurpius et al. 2010).

Hyperlocal media are "geographically-based, community-oriented, original-news-reporting organizations indigenous to the web and intended to fill perceived gaps in coverage of an issue or region and to promote civic engagement" (Metzgar et al. 2011, p.774). They are designed to provide details about life and experiences in a localized

setting, and are accessible through the Internet. They are a place for members of a community to self-report on what is important to them and work with Web 2.0 technologies to provide an alternative or often overlooked view (Gillette et al. 2007; Metzgar et al. 2011). Although the use of online technologies makes this information broadly accessible to anyone with a computer, more likely the limited focus of content means that only a smaller, more engaged and localized audience exists (Metzgar et al. 2011). Gaps in local media reporting can be filled with comments, conversations, opinions, and analysis, taking advantage of unique local knowledge and increasing civic capacity (Bruns et al. 2008). There are numerous examples of these hyperlocal media sites impacting people, allowing people to get involved, engaging in serious discussion, and giving people voices who may been excluded before (Gillette et al. 2007; Schaffer 2007). However, it is warned: "simply creating an interactive site within which participation can take place is no guarantee that it will" (Metzgar et al. 2011, p.783). Like with participatory research projects, with hyperlocal media participation can never be assumed or expected and should be nurtured and coveted.

While each hyperlocal site will vary in terms of the management policies (to edit or not to edit), and uptake in the community, which can vary from struggling to get enough readers to struggling to manage the content that pours in. Many sites face initial enthusiasm but soon fade as participants grow weary and move on. Marketing must be considered and is an important part of tool management. As with many new technologies, "the question is whether they are fads, short-lived efforts that may bloom and fade like some blogs, or fundamental realignments of local news delivery" (Schaffer 2007, p.8). These sites depend on participants but can provide a hugely varying, uncensored view of the experience of life at this hyperlocal level, as reported by those who know it best.

This hyperlocal reporting has been successfully harnessed during a wildfire event in California in 2007, hosting extensive and up-to-date information posted by community members for other community members (Gillette et al. 2007; Glaser 2007). In Glaser's (2007) case, public and local media worked together to provide the best information available hosting fire updates, micro-blogging, Google maps, and other formats. While the media was quick to run user-submitted photos and videos, "even the best local coverage of the wildfires sometimes failed to provide the hyperlocal level of information

that many directly affected by the fire sought" (Glaser 2007, n.p.). Online forums with almost 9,000 posts allowed users to connect and share information. Their map received over 1.3 million hits and "online collaboration and aggregation played a huge part in helping smaller local outlets tell a complex and fast-moving story" (Glaser 2007, n.p.). Their ideal was to get up-to-date government data on their map, but ultimately it proved impossible for liability reasons.

The Fire History project described in this thesis builds on this idea of combining public data and hyperlocal media data, but in more of a historical sense. It examines participation with the tool and motivations to participate. While the map has the potential to visually represent the forest fire in a new and exciting way, we must uncover how best to garner public participation and encourage users to volunteer their geographic information and experiences.

2.4 Volunteered geographic information and the participatory Geoweb

Enabling members of the public to self-report on their local environment is a key aspect of the participatory Geoweb. Neogeography has emerged as the study of the development and implementation of technologies that allow for the creation of online databases of volunteered geographic information (VGI) (Goodchild 2007b). The Geoweb includes some of the technical aspects of GIS, but is simplified, thus allowing for increased public participation. Geoweb applications have been developed to help with anything from buying a car through to participating in local planning. The Geoweb's ability to take advantage of individuals' local knowledge is increasingly thought to democratize the map making process, making it more flexible and accessible (Goodchild 2007b; Sui 2008). However it should be noted that both the Geoweb itself, as well as the concomitant study of Neogeography, are still young and evolving, thus making the understanding of this emerging field complex, though relevant.

Goodchild first used the term 'Volunteered geographic information' in 2007. In essence, it is "the widespread engagement of large numbers of private citizens, often with little in the way of formal qualifications, in the creation of geographic information" (Goodchild 2007b, p.212). VGI represents a dramatic change in geography – the creation of a new (or neo) geography that affects the field and society at large (Goodchild 2007a); it is geography without geographers (Sui 2008; Turner 2006). Information flows multi-

directionally and individuals who in the past were simple consumers of information can now be producers too (Bruns 2008). Tens of thousands of amateur cartographers are investing massive amounts of time contributing to and creating these online maps and databases with no financial reward or even assurance that their information will ever be used or read by anyone (Goodchild 2007b). As new tools and technologies come online and as new users begin to use them, VGI offers rapidly expanding cartographic possibilities. As Turner (2006) explains:

> *Where historically a professional cartographer might use ArcGIS, talk of Mercator versus Mollweide projections, and resolve land area disputes, a neogeographer uses a mapping API like Google Maps, talks about GPX versus KML, and geotags his photos to make a map of his summer vacation* (p.2).

In the past, mapping has been an expert-only field, limited to those with power and the resources to pay cartographers (Goodchild 2007a; 2007b). However, now there is an increasing demand for more democratized mapping processes, and an overall shift to developing greater public participation in spatial decision-making processes (Elwood 2010; Goodchild 2007a).

2.4.1 Enabling systems

The ability of the Geoweb to solicit participation in spatial issues is tied together with more fundamental changes occurring within the Internet as a whole. Original Web 1.0 systems imply an Internet where information was communicated from the producer to the audience; they were designed to be informative, expert created, top-down, and were difficult to manipulate. Web 2.0 represents a "collaborative approach to networking, consuming and remixing data from multiple sources and going beyond the page metaphor of Web 1.0 to deliver rich user experiences" (Nuojua 2010, p.7). Web 2.0 made the real-time online sharing of knowledge possible. In a Web 2.0 environment, users became producers as well as consumers of information. Through mass collaboration they can cooperate to solve problems or share knowledge and create online databases (Bruns 2008; Sui 2008). These online databases are built on the premise that everyone is an expert in something, even if only their own environment, and that the Geoweb becomes an online space where amateurs and experts can come together to create and contribute to

databases. Geoweb resources make no distinction between experts and non-experts, considering each contribution equal and allowing other participants to agree with or refute posted information. This is often referred to as collective intelligence (Grira & Bédard 2009; Hudson-Smith et al. 2008). As people become increasingly interested in adding information to the Internet, there are huge amounts of data now being shared and made available (Flanagin & Metzger 2008; Haklay et al. 2008).

Through the Internet, Geoweb applications are now easy to use and in many cases free. Previously GIS software costs were prohibitive, needing expensive base data and complex computer coding (Haklay et al. 2008). But, most Geoweb software is open to manipulate and develop on top of, thus any programmer, with the requisite skills, can create an application and others can download and use it for their own projects. Enabled by Web 2.0, this open software movement encourages the development of software that may not otherwise be economically viable. These programmers share it for free and this allows others to edit and improve on their work. The Geoweb is now increasingly becoming a commercial venture.

A further enabling factor behind VGI and the Geoweb is the individual, an idea encapsulated by Goodchild's theory of 'humans as sensors'. He considered "humanity as a large collection of intelligent, mobile sensors, equipped with abilities to interpret and integrate that range from the rudimentary in the case of young children to the highly developed skills of field scientists" (Goodchild 2007a, pp.25-26). People, with five senses and their life's experience of interpreting the world, are a potentially useful though highly underused resource in mapping. In the past, recording geographic information was seen to require special skills and training, despite the fact that many observations require little actual skill but local knowledge, something a brought-in expert does not have (Goodchild 2007b). By investing in local citizens to be the sensors and interpreters they are able to impart more than just an image but a unique way of understanding the world. The ability to enable humans to be useful sensors in gathering information to upload to the Geoweb is being dramatically increased through the rapid uptake of mobile location-aware devices such as cell phones and GPS.

Web 2.0 has enabled the creation of a vast online world that can answer a range of questions by asking, not experts, but other people. These technologies are finally cashing

in on the knowledge collectives residing in society, what Bruns (2008) calls 'harnessing the hive'. While many of the more successful tools are more interested in social networking, photo sharing, or less 'serious' goals, neogeographers and their map 'mashups' are pioneering new ways to tell a locational story and to better understand relationships (Batty et al. 2010; Hudson-Smith et al. 2009; Turner 2006). Neogeography can also combine local knowledge with existing spatial databases. Goodchild (2007b) calls this a 'patchwork' and patchworks are often used by governments to supplement their own limited data, although there can be problems with combining 'official' and publicly contributed data (Elwood 2008). The new geographic awareness created by VGI is changing the way that society views and interacts with spatial data and the knowledge politics of geographic information (Birdsall 2007; Elwood & Leszczynski 2011). However, this technology evolves rapidly and researchers struggle to keep up, grappling to understand some of the broader implications of VGI (Coleman 2010). Ultimately, there is the potential for much more research that can evaluate widespread engagement in these spatial online resources.

Ironically, much of the literature on VGI is a patchwork itself, borrowing extensively from Participatory Mapping, GIS, Public Participation GIS, GIS and Society, Critical GIS, and Feminist Geography literature. Discussions on inclusion/exclusion, power relations, representation, and privacy are borrowed from the field of PPGIS (Sieber 2006; Tulloch 2007). Feminist geographies lend unique methodological considerations (Elwood 2008; Kwan 2002; Schuurman & Pratt 2002), while Critical GIS examines more theoretical ideas on spatial data access, management, and sharing as social and political constructs (Schuurman & Pratt 2002). These fields examine the societal effects of GIS and by being adopted into VGI these critiques can lend legitimacy and provide new areas for VGI research. There is also an opportunity to learn from the successes and failures of these fields and promote quality research in what is otherwise a very young and under theorized field. These related disciplines continue to be a boon to VGI research, informing VGI literature as it solidifies into its own discipline. While these sister-fields will likely always benefit from each other, VGI has begun to build a base of VGI-centric literature, mostly based on the work of Goodchild, Elwood and Sui.

2.4.2   Concerns

Despite the lofty intentions of VGI, the field faces some barriers and criticisms in order to be taken seriously and to take place with a clear ethical conscience. Concerns of VGI include: the digital divide and inclusional/exclusional capabilities, lack of trust and authority, problems with the independence and seriousness of VGI and, most importantly, the organization of data.

Although VGI claims to work against top down, elitist cartography and create a Geoweb on which everyone's knowledge counts equally, there are still questions concerning the potential for tyranny. VGI is rarely fully representative and those on the wrong side of the digital divide, lacking the technology to participate, can be excluded (Chakraborty & Bosman 2005; Sui 2008). Key questions need to be considered about whether crowd sourcing can actually enlarge disparities. Misrepresentation can occur as well, where a small group speaks on behalf of the non-participants without their consent (Elwood & Leszczynski 2011; Goodchild 2007b). There are also concerns of data misuse since not all participants are fully aware of the potential uses of their information (Elwood 2008). As Goodchild (2008) explains:

> *Citizens volunteering geographic information clearly do so in the belief*
> *that it will be open, accessible, and free, and may even be of critical value*
> *in some future emergency…. But it is also easy to imagine circumstances*
> *in which volunteered information, about oneself or one's neighbors, leads*
> *to forms of exploitation that were difficult to foresee* (p.242).

Participants post information intended for one purpose but within the online sphere it can have other unexpected uses. Sui (2008) and Elwood (2010) also identify privacy and liability as prime concerns for the VGI. This is not a problem exclusive to VGI, but is a growing concern of Internet use in general.

Another problem with VGI is in trust; whether, trusting users, trusting the technology, or in trusting the information provided. As users are anonymous, "standard conventions of determining credibility break down in cyberspace" (Flanagin & Metzger 2008, p.140). Trust is key in a person's willingness to participate; those who have faith in the source are far more likely to contribute to it. Self-representation can bolster participation by making the online sphere less anonymous and this explains the success

of social media like Facebook (boyd & Ellison 2008). Fostering trust between the site creators and users can be difficult. Many tools have such rough interfaces that people fail to trust the tool itself, which also makes them less willing to share. The final area of mistrust relates to the information already on the website. Generally, tools that require more fact-based information need a wealth of users to prove or disprove and correct each other's data. At this point, collective wisdom can eliminate errors through a wealth and diversity of data and users (Grira & Bédard 2009). Other tools rely on citizen science, where members of the public are trained to make better observations and more accurate contributed data (Lukyanenko et al. 2011). However, other tools rely on more situated or unique data, like stories or opinions, which cannot be proven as inherently right or wrong but can be refuted or agreed on by other users. Here credibility depends on relative trustworthiness and believability of information or sources rather than on their accuracy (Flanagin & Metzger 2008). In the first case, collective wisdom is expected to weed out falsehoods while in the second a breadth of users can complete the patchwork and provide a nuanced view of an event or place. However, getting enough users for collective wisdom to work or for these patchworks to be created can be difficult (Bishop 2007) and many groups struggle to have their 'unofficial' viewpoints taken seriously, particularly by governments and larger organizations (Ashley et al. 2007). VGI has a reputation of being highly non-authoritative and therefore something to use, but not rely on (Elwood & Leszczynski 2011).

Because of this lack of trust and perceived unreliability of VGI, it tends to be seen as a rather frivolous endeavour. Since VGI tools and mashups have begun surfacing, there are now maps on nearly everything and many are created in the name of fun. Maps that, for example, map public toilets or alien sightings in America make others wonder just how serious VGI can be. Many see VGI as a fad with an overall limited shelf life (Goodchild 2008). The goals of VGI projects are singular (eg: "Let's describe the whole world") rather than continual, planning for long term updating. Will people be as interested in maintaining the maps as they have been in creating them? There is also debate as to whether VGI can truly stand alone as an academic field, since it is already so intertwined in other areas within geography, and as a tool. The most successful tools augment pre-existing social relationships and it seems unlikely for groups of people to

gather online independently. Even for particular uses such as planning, VGI tools function alongside traditional community meetings and other methods of gathering information. In Nuojua's (2010) planning work the online tool was supported by meetings and it seems doubtful that it would have worked without the meetings to remind people to go online or without the community being told that that was how to make their voice heard.

Perhaps the biggest flaw in VGI currently is a complete lack of comprehensive organizational structures. When governments post information online it is all in a specific format, grouped and assembled to make information easy to find and interpret. However, with VGI "there has been a general lack of the mechanisms by which such information might be communicated, assembled, integrated, and interpreted" (Goodchild 2007a, p.26). When millions of details are being provided it is a huge undertaking to organize them into a single source that is still usable by the public. Those tools that have the most success seem to be the ones with the narrowest field of interest or that have the most straightforward, factual information. Although VGI is organized spatially on each tool it is normally done by the user and may not be correctly placed. Other data issues have arisen concerning too much data being available; with masses of useless, unproven data online it makes it increasingly difficult to find verified, accurate data. As available data increases, sorting, storing, and sharing data becomes problematic and makes it that much more disorganized. As desirable as this bottom-up approach may be, there are far too few organizational systems in place, making data chaotic (Elwood 2008). "The Internet presents a very different environment—one of information abundance— which makes traditional models of gatekeeper oversight untenable due to the sheer volume of information that would have to be vetted" (Flanagin & Metzger 2008, p.140). While originally one of the advantages of VGI was its lack of gatekeepers, organizational structures, or authors these can be serious deterrents not only in assessing whether to trust data but also where to find it.

2.4.3 Possibilities

Despite these concerns, the Geoweb shows considerable promise in making new connections between people and place. "The most important value of VGI may lie in what it can tell about local activities in various geographic locations that go unnoticed by

the world's media, and about life at a local level" (Flanagin & Metzger 2008, pp.220-221). When communities want to put themselves on the map, VGI can help them do so, fostering community engagement easily and inexpensively (Nuojua 2010). Yet at the same time it still allows the public to contribute on their own terms. They can post whatever they like in whatever format they like, and the results have proven the incredible creativity and care that participants are willing to put into VGI (Tulloch 2007). The Geoweb allows for contrasting information in the form of multiple knowledges, which lets disagreements exist with a certain degree of harmony (Elwood 2008). Also, Geoweb tools can be extremely responsive and adaptable; what does not appeal to community members initially can be altered and updated until it does. Development of the tool is never-ending with new prototypes and updates constantly working towards meeting users' needs (Nuojua 2010). Finally, compared to other methods of information gathering VGI costs very little (Flanagin & Metzger 2008). Open source software is free and requires much less skill to set up and even less to contribute than GIS or other tools. The Geoweb has the potential to "gather, visualize, produce, and share information on a scale never before achieved—from millions of potential contributors—and to create digital records of human observations and experiences never before recorded and saved as digital data" (Elwood 2008, p.174). Through the Geoweb, space has been introduced to the formerly spatially neutral realm of the Internet.

3. Pilot Study

3.1 Providing opportunities to share

Past studies in geography on forest fires primarily approach the issue from a resource management-based perspective, examining how to better model and predict forest fires, usually in natural areas (Barboa et al. 2010; Castro & Chuvieco 1998; Chuvieco & Salas 1996; Erten et al. 2002; Hefeeda & Bagheri 2007; Jaiswal et al. 2002; Karafyllidis & Thanailakis 1997; Lee et al. 2002; White et al. 1996). These studies are all primarily concerned with the physical effects on the landscape itself. However, with populations increasingly expanding into forested zones, there is a need to study the effects that forest fires have on human populations.

With the emphasis on the Central Okanagan, we[1] hypothesized that an online mapping tool could harness hyperlocal volunteered geographic information and thus provide a patchwork of public experiences related to forest fires. We set out to develop and deploy a Geoweb tool that could collect and record the human dimension of the impacts of forest fires. First, we employed a pilot study to assess interest in the issue and technological concerns as well as ascertain the technological viability of the project and what the main study would entail. This section will describe the pilot study, which in turn serves as a sort of technological literature review, demonstrating how the full research project described later in the thesis evolved.

The pilot study began in the spring of 2010 and tested the technological viability of a Geoweb forest fire map that linked localized 'experts' (those with experience of forest fires) online through geotagged text, video, and photographs. We sought to map as many fires as possible throughout the province and over a multi-year time scale, targeting people affected in any way. The results from this project guided the second stage of this research project, discussed fully in chapter 4.

With the 2003 Okanagan Mountain Park Fire still reasonably fresh in the public's mind, we felt that there was a lack of opportunity for public dialogue related to forest fire

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[1] Throughout this thesis I chose to use the pronoun 'we' when describing any decisions or actions performed by the research team. At this stage, the research team consisted of Jon Corbett, Aidan Whiteley and myself. We also relied heavily on the technical skills of Nicholas Blackwell.

impacts. While there were limited avenues to speak to the media or one of several authors writing books about the event, many people were left out and the dialogue was always one-sided, with little possibility for discussion. We also wanted to recognize that "citizens for the most part do not desire to contribute fully reported articles with leads, middles, and ends, or to communicate their experiences in polished essay form" (Schaffer 2007, p.10). While some might want to be 'journalists' and gather information to write their own articles, "more commonly, citizens contribute pieces of information to narratives that take form over a series of posts, or in tandem with other posters" (Schaffer 2007, p.22).

We determined that a spatial and temporal participatory Geoweb mapping tool could provide a suitable platform for discussion and information sharing. It could also examine the potential of the Geoweb to capture and present locational information over space and time in a comprehensible way. We were also interested in examining whether the site could encourage any sorts of dialogue on forest fire risks in the area; and finally whether it could be an accessible and engaging medium for forest fire discussion.

The Geoweb was chosen to display these discussions rather than paper mapping; online tools are adaptable and can reach a large number of people with a relatively lower cost, as well as being easy to monitor and facilitate. Given the choice between online forums, social networks, and news sites, a participatory online map was determined to be the best to allow the sharing and accessing of information about the fires temporally and spatially. By adding a time bar along the bottom of the map, it could provide a useful overview for interested members of the public, with the opportunity to zoom in to specific areas for more details. Those who could not grasp how much area had burnt could now see this directly on the map and could also compare the true extent taken across different years.

This pilot was a university-centred project. We were mainly concerned with technological viability of the map and proof-of-concept, although we hoped to build the support of an online community, enhance relationships, foster discussion, and promote the sharing of information. If the map worked, then we planned to explore how the public used the site, and whether it would be focused on educational purposes or more about sharing. We also wanted to determine if the members of the public were even interested.

3.2   Description of the tool and testing

The online participatory map used in the pilot, and later adapted for the full study, was created using an adaptation of the Google Maps API software called Geolive. This application was created at UBC Okanagan to facilitate and personalize the creation of maps (www.geolive.ca). We originally hoped to add to the map the perimeters of forest fire burn areas for the province of British Columbia from the early 1900s to the present day. These data are technically in the public realm on the website of the Integrated Land Management Bureau. However, obtaining the data took numerous phone calls and web searches. This difficulty reinforced the need to make this information accessible to a broader public. Even once we managed to obtain the data, it took several attempts to convert the file type before it was usable.

As with any mapping project, many decisions were made regarding what to include and what to exclude. Originally we had planned to use all available fire data to create a British Columbia-wide map spanning 100 years. However, this dataset contained tens of thousands of points and in terms of data management that was unreasonable. The sample was shrunk to the Okanagan Shuswap regions from 1985-2009. The shape files (.shp) of the precise burn perimeters, as well as important information such as date of discovery, burnt area (in hectares), and suspected cause, were added to the map with each year a separate layer. We also made the decision to eliminate any fires that were smaller than 0.1 hectares, since those would barely be visible on the zoomed out map. These layers were opened and edited using Google Earth, where we selectively linked available media, including articles, photos, videos, and even excerpts from online forums to the fire they pertained to. The timeline, a unique feature of Geolive at the time, allowed each year to be a separate layer with a bar at the bottom that could be dragged from year to year, showcasing the different fire seasons. In case some users were less geographically inclined, we also created a forum where users could create discussion topics and share. With this combination of technologies, it was possible for users to create accounts, add points to the map with pictures, text, or video, and to participate in the forum discussions.
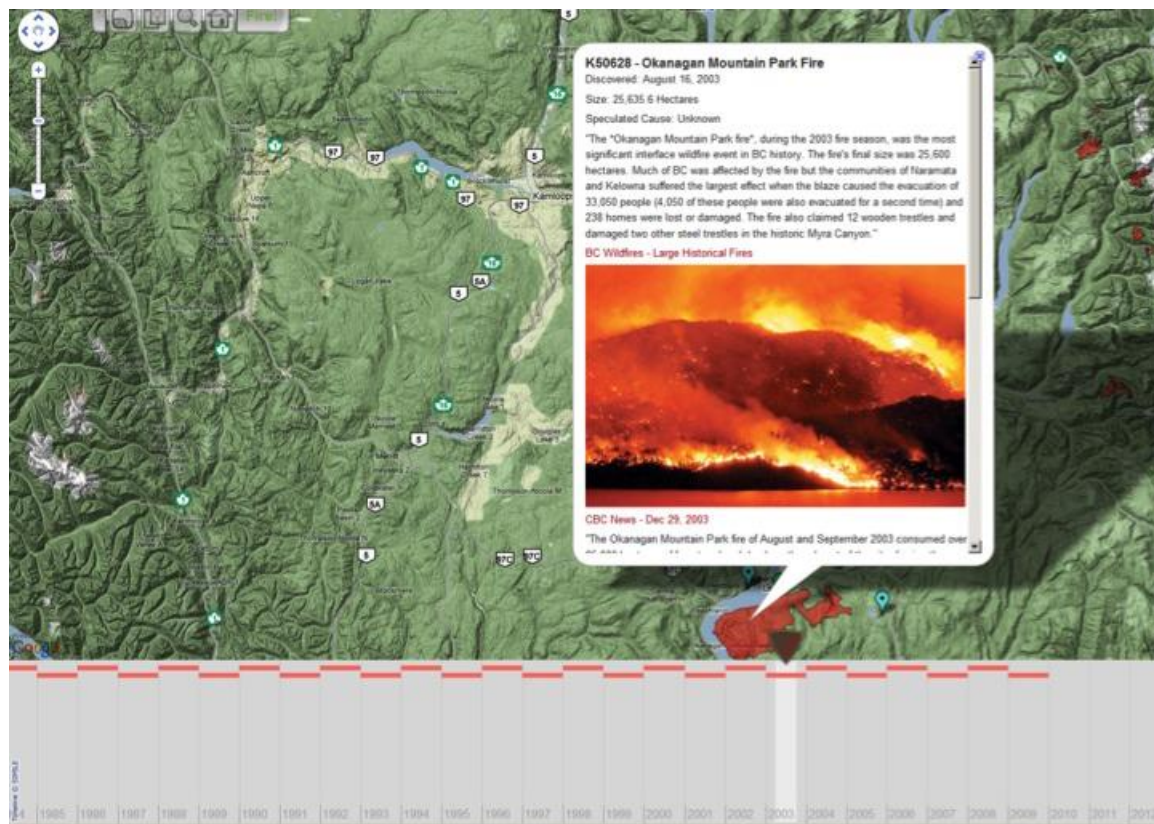
Figure 3.1: Fire History pilot map interface

Upon completion of the map, an entire website was built around it. The site included login capabilities for contributing to the map and forum, user help guide as well as other related links. Fires appeared as polygons on the map and were interactive. Clicking on the point or polygon would bring up an article containing fire descriptions, probable cause, statistics, personal stories, and media (as seen in Figure 3.1). Registered users could input information directly onto the map or upload media to the server. The photo uploader proved challenging because it required the ability to save photos to the server from a home computer, viewable to all while keeping them separate and only editable to the person who uploaded the photo. Considerable time was spent trying to make the site as smooth and simple as possible so as to be of maximum usability to users. This meant perfecting the photo uploader, simplifying the forum and front page, and adding a how to page with step-by-step guides to the usage of the map.

When the site design was complete we began initial testing. Because we understood how the site worked, having created it, we considered ourselves biased and too invested to notice potential problems, even obvious ones. Interview-workshops were

arranged with members of the public affected by forest fires to test all the functions of the website, and then to take a survey to share their opinions and experiences. Given the short time frame of this initial test we wanted at least 5 people to test the site. Participants were recruited by word of mouth from an Introduction to Human Geography course and included other impacted students and community members. Since most participants were linked to the university in some way, either as a faculty member or a student, interview-workshops took place on campus. Participants were brought in and given a computer, or allowed to use their own laptops, and instructed to explore the site and explore its various functions. A member of the research team was always on hand to help users who had difficulties. However, users were largely left on their own to navigate and add content to the map. After testing, participants were given a survey (see Appendix A). Using these completed surveys, as well as observations, we determined whether the initial goals had been met and what conclusions we could reach.

3.3   Study results

Survey and interview-workshop results indicated that the project was successful in fulfilling many of its original goals including visually representing forest fire burn areas in the Okanagan Valley, providing an accessible and engaging platform for public discussion, and concluding on what makes a useful online participatory mapping tool. Less successful were the goals to increase awareness and promote dialogue regarding forest fire risks in the Okanagan due to limited participation and few users. These results proved useful when creating the larger Masters project research design described in the later sections of this thesis and helped us justify our future direction for the site.

We determined that it was possible to create a Geoweb tool that contained both spatial and temporal axes. The map could contain a large quantity of information while remaining clean to the eye and well organized. Since the organization of Geoweb tools is often problematic (as discussed in 2.4), we concluded this spatial-temporal mapping model was a success. The Geolive tool itself was also successful despite some flaws. Geolive is unique in taking the Google Mapping software that the public is increasingly comfortable with and being able to flexibly add new elements such as the time bar or the overlays of the fire burn perimeters. Overall, the idea of using Geolive to map these fires was proven to be sound.

The pilot study also examined whether or not members of the public are interested in past forest fires. Many forest fire-related mapping projects target forestry experts. We were concerned about the possibility that the average person was simply not interested. Participant survey results showed that members of the public are very interested in viewing the site, providing their own fire-related information, and engaging in discussions online. Results suggested that the site worked well for disseminating information, with participants proving willing to post information and read other users' materials. Although the website did not contain large quantities of discussion material, this was likely due to the fact that the website had not been online during a highly active forest fire season.

While the overall technical concept worked well in the pilot, there were some technical issues that persisted and we understood would need to be addressed for future projects. These issues mainly depended on browser preference. When creating the website we assumed a certain level of computer skill and certain software standards. However, upon engaging participants it became clear that few people update browsers regularly. As a result, while the site was debugged for newer versions of Internet Explorer, Firefox and Google Chrome it had numerous glitches on older versions of the software. This is increasingly problematic due to the high proportion of elderly people in the Okanagan who may not even understand what a browser is. To counter this, we recommended much more time and effort be put into debugging across browsers and versions. One notable error that occurred was with saving points to the map. This often required multiple attempts by the user and was generally finicky, contributing to user frustration and raising the potential for lost data. While we understood and were comfortable using the tool, users had certain issues that we had not anticipated but which could be solved for future endeavors.

We also established that there is a fine line to walk between ease of use and functionality. The more functions and abilities that are added to the map, the more broadly applicable the site can be. However, this also renders the tool more cluttered and potentially confusing, which can drive users away. For example, having the time bar at the bottom of the map (see Figure 3.1), adds a new level of functionality to the tool but some users were confused and uncertain about its purpose and how to use it. For the next

incarnation of the Fire History map we wanted to tread the line between functionality and usability. Determining exactly what capabilities the tool should and should not have required a better understanding of audience and scale. As this was a proof-of-concept many additional abilities of the map were added to see if we could make them work. Surveys showed certain capabilities were more confusing or uninteresting than beneficial. For instance, not one person used the discussion forum.

On the qualitative feedback survey, participants made a number of profound observations. When asked to provide three words that best described the site comments included "substantial, generous and multi-layered", "interesting", "informative", and "effective". One user confessed to be less computer literate and also reported "I don't understand mapping". This issue of spatial literacy could be a barrier to fully utilizing the site, and is a difficult issue to resolve since simplifying the site further would result in a loss of functionality. However, the user did still enjoy using the site and claimed it was worth returning to for the photos. All participants managed to navigate the website without problem; when asked if they would visit again every single participant claimed that they would, particularly if the site was updated each year with current fire statistics and more photos. The survey results indicated that the map was the biggest draw of the website for its ability to provide information in an instantly recognizable way and for its ability to collect new information.

However, in order to encourage participation in using these sorts of tools, people need to know they exist (Schaffer 2007). This was one particularly weak area of the study. As discussed in earlier sections (particularly 2.3), the media often reports on disasters, particularly forest fires. This interest in forest fires was beneficial when we sought to introduce more visitors to the website because several articles were written about the project in both local and national media. From May to August 2010 the FireHistory tool was featured on Juice FM, CHBC News, a UBCO Special Update, The Globe and Mail, News 1130, and the Kelowna Capital News. However, despite this press interest, the website still had few users and little outside participation and interaction. While visits to the website increased, few people posted information. At this point there were still relatively few points on the map and it served to drive home that the initial momentum was hard to achieve. In the future, we suggested getting a more local base of

participants through the use of localized media and to rethink the benefits and motivations behind participation, which were under-theorized for this study. We also considered a more sophisticated use of marketing including print, radio, and online news as well as social media.

Another key finding was that certain fires – interface fires in particular – drew considerably more interest. Because this study had such a broad and undefined audience, it made it more difficult to tailor it to a specific type of user. Future studies needed to consider targeting a smaller but more interested group and working with them to provide what they needed. The scale and design of the map should be adjustable as well. For instance, instead of targeting everyone affected by all fires in the area over 25 years, we would next choose an individual event and target a smaller group more intimately. The best way to do this is likely through community involvement, whether choosing a clearly identifiable affected group or trying to create a localized one through the tool. A less university-centric approach was also considered important for the future, and more community involvement that can help spread the word and ensure that people not only know about the map, but have the opportunity to impact how it is created and its function. Through a better consideration of audience from the inception, a project can benefit by working closely with the intended audience to create a tool that they have an interest and a stake in.

While this pilot project functioned as an effective test of many of the technical aspects of the fire map it was the social aspects where the project faltered. Creating a tool that is unique and functions well, even with some media attention, is not enough if the audience has not been considered. This site could be an effective tool to learn more about the human impacts of forest fires on members of the Okanagan community but to reach higher levels of participation it needs to be created in collaboration with community members to fulfill their needs, whether those needs involve sharing, socialization, or education. Having completed this pilot, the next step in the fire mapping project was to focus on a specific fire and reach out to those affected to contribute to this patchwork and provide new opportunities for sharing and knowledge collection. The participatory Geoweb should forge better relationships and consider people, earning participation instead of expecting it.

3.4   Research question

During the pilot project we found that the fire most commented on and mentioned in media was the Okanagan Mountain Park Fire. The previous chapter has demonstrated the importance of the 2003 Okanagan Mountain Park Fire for the Kelowna area, particularly for the firefighters, evacuees, and volunteers. By engaging some of those people affected who want to speak out about the fire or share their experiences there is the potential to create a lasting patchwork to record the various experiences and impacts of this forest fire. In this case, the Geoweb can be tested as a tool to better understand issues or events and explore the difficulty of overcoming apathy surrounding participation. Specifically I am interested in motivations behind participation and individual experiences. With that in mind, this thesis sets out to answer the following research question:

> *What factors can influence an individual's willingness to volunteer their*
> *geographic experiences related to the Okanagan Mountain Park Fire?*

The next chapter will present the research design, justifying theoretical and practical considerations and methods as well as discuss community-based participatory research.

4. Methodology

4.1 Theoretical considerations

The theoretical underpinnings of this research are linked to the previous discussions of volunteered geographic information and in particular the notion of a patchwork of knowledge (Goodchild 2007b). This idea presupposes an ontological understanding in which each person sees and understands the world with different, overlapping, and even contrasting points of view. In this research, multiple meanings and voices are fully accepted and presented with equal value with each individual voice understood as one potential version of events. It is an "interweaving of viewpoints" (Guba & Lincoln 2004, p.197) where all individuals may be represented. Just because the event was understood differently by someone does not mean that one of them is wrong. Indeed, I find it impossible to interpret the massive range of impacts of the forest fire by the affected population, especially given their strong emotional basis, as being correct or incorrect. Views are socially and culturally influenced, even two people who experienced the entire event side-by-side – as many firefighters did – would find that it affected them differently. Combined, the realities of many individuals can create a more thorough understanding of how different (and how differently) people understood and experienced this forest fire event.

In communicating this knowledge, I consider the process of sharing, whether face-to-face or online, an essential component of this thesis. This research depends on the sharing of information, knowledge, and stories between the researcher and participants, the researcher and partner organization, and between users of the online tool. Research questions concern the effectiveness of online tools and by entering into a dialogue – whether technologically mediated or not – we can better understand the experiences of others. The patchwork created on the map is one that places local knowledge alongside professionally produced stories and allows more people to be included in this sharing process. In terms of the research, sharing about experiences and the tool will best occur as a dialogue, and one where the researcher is not stoic and removed from the research endeavour but where the researcher acknowledges her own personal story and interacts

with the research participants. I am a passionate participant myself, and self-reflective, and this will be clear in the way these interviews are carried out. Views are ever changing and will shift as the researcher and participant co-create meaning. Through this online tool, the public can play a role in constructing not only our understandings of forest fires but how this event will also be remembered from a historical perspective.

Because of the highly personal and emotional nature of many peoples' forest fire experiences, I use a qualitative approach, encouraging people to discuss their feelings and memories regarding the forest fire, and explaining whether the Geoweb tool can help present and learn about the disaster in different ways. Although quantitative data could provide statistics on website users, or short answers on why people do or do not participate in this online map, only through qualitative methods can I determine some of the more complex motivations and opinions and have a thorough discussion about the fire, the tool, and their experiences to determine what influences an individual's willingness to volunteer their stories.

4.2   General research design

This research was informed by a pilot project conducted in 2010 in which we designed a map that depicted forest fires over a 25-year period for the Okanagan Valley. The project was largely a proof-of-concept experiment to develop the mapping technology however it also employed a small-scale mixed-method survey to garner feedback from a select group of users. Although the map was created to support public participation, the research focused on evaluating website usability. Ultimately, the map showed considerable promise, visualizing fires across the Okanagan region in an accessible way and demonstrating a new medium for the public to connect with this information. After the media coverage that this project received, the director of the Kelowna Fire Museum and Education Centre contacted the research team[2] about the possibility of collaborative work. This launched my Master's project, in which we decided from the beginning to collaborate completely with the museum in community based participatory research to create a living historical map of the Okanagan Mountain Park Fire. This collaboration increased the number of voices directing the study as well

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[2] As in chapter 3, at this point the research team consisted of Jon Corbett, Aidan Whiteley and myself.

as provided the opportunity for this project to become more meaningful in the long term, as well as help the data to be more effectively used by the broader community. Through participatory mapping and unstructured interviews, I was able to establish positive and fulfilling relationships with participants as well.

The Kelowna Fire Museum and Education Centre was established to preserve Kelowna's firefighting history and to present an injury prevention curriculum for children from pre-school to grade 8. The museum is comprised of current and retired volunteer and career firefighters, as well as interested members of the public. Currently, it is a volunteer-driven, not-for-profit organization housing an education centre, coffee shop and museum. It houses thousands of artifacts and a number of restored pieces of fire equipment dating back to the 1900s. One of the exhibits concerns the 2003 Firestorm where the Geoweb map developed over the course of this research project will be displayed as a kiosk and further soliciting public participation.

The Geoweb map was created and tailored specifically to be a keystone in the Okanagan Mountain Park Fire exhibit at the museum and to function as an online historical record. This allowed the research team to evaluate the tool and advocated participation in a real-life setting, demonstrating the successes and failures of the Geoweb as well as positioning us with the means to evaluate what influences people to contribute.

As with any research involving the community, my positioning extends beyond simply being a researcher (Bringle & Hatcher 2002). To increase my immersion in the issue and to provide valuable assistance to the museum, I chose to become a volunteer and worked closely with other volunteers on exhibit preparation and accessioning of artifacts. This work is useful for the museum as well as beneficial in creating those firm ties that help build a strong research relationship. Although I was evaluating the effectiveness of online tools and writing a Master's thesis about the mapping project, my ties extended beyond this, and I became heavily invested in the museum. In traditional research this would be considered inappropriate bias, however it also positions me uniquely as a partial insider and outsider (Mayan 2009). I am an insider for my involvement with the museum and yet still an outsider due to my involvement with the university, as well as because of my limited age and experience as well as my gender in this predominantly older, male group. Being aligned with the museum, I was able to get

closer to participants and make interviews more comfortable. Mayan (2009) writes about duality and this idea of different dimensions of self, in this case as a volunteer and a researcher, and how it can be advantageous. Without my involvement in this volunteer work, I would have been considered a complete outsider and likely would have had difficulties finding participants.

4.3   Community-based participatory research

In the past, campuses and communities have had a poor relationship where communities are seen as "pockets of needs, laboratories for experimentation, or passive recipients of expertise" (Bringle & Hatcher 2002, pp.503-504). Too often, communities have been used by researchers to complete their own research and there is little commitment to helping the community or effectively implementing their work. Following the tradition of community-based research, we[3] sought to overcome these ideas and create research that was less about the 'science of discovery' and more concerned with practical matters of integration and application.

There are a number of terms and definitions for research that works directly with the community, all of which differ slightly and are often purposely vague. 'Action Research' was coined in the 1940s and referred to flexible and responsive research that worked with communities to make informed decisions and recognized the need for long-term research commitments (Lewin 1946). From there, Friere (1970) took on the discipline replacing Lewin's rather loose idea of change with change-as-essential. His work led a wave of Participatory Action Research across the world, emphasizing issues of equality and community involvement (Kindon et al. 2007b). This first surge of interest solidified participatory research and was followed by another wave of researchers in the 1980s in which community and international development contexts were key (Kindon et al. 2007b).

From its inception, participatory research has always been highly multidisciplinary, layering elements from many other disciplines (Brydon-Miller et al.

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[3] Throughout this thesis I chose to use the pronoun 'we' when describing any decisions or actions performed by the research team. At this stage, the research team consisted of Jon Corbett and myself with Nicholas Blackwell providing technical skills with the Geolive technical component. It also included members of the Kelowna Fire Museum & Education Centre, particularly the museum director.

2003). Participatory research works through many perspectives including feminism, post structuralism, post colonialism, Marxism, and critical theory. For example, since the 'cultural turn' in the 1990s feminist researchers have lent interests in equality, reciprocity, partiality and the value of ordinary voices as experts (Brydon-Miller 1997; Maguire 1987; Pain 2004; Pain et al. 2007). Postcolonial critiques examine relationships in participatory research, concerned about researchers asserting themselves as 'experts of participation' (Pain et al. 2007). Finally, geography incorporates a spatial perspective, not just across space but also through different scales to examine local, national and international ideas (Kindon et al. 2007a). The result of this mishmash of offerings is participatory research that is multidisciplinary, highly adaptive, and fully considers purpose, objectivity, ethics, ownership, and community (Strand et al. 2003).

The flexibility and range of participatory research is a boon for the research, but makes definitions difficult. Participatory Research (PR), Participatory Action Research (PAR), Action Research (AR), and Community-Based Research (CBR) are often all used interchangeably; however, each researcher defines these terms differently. Adding to the confusion is the tendency of some groups to call research 'participatory' to make it seem more legitimate than it may be (Ife & Tesoriero 2006). Finally, due to the flexibility, variation, and wide usage of participatory research, what definitions there are, are by necessity vague.

In the past Participatory Research and Action Research have been separated, with the former concerned with increasing citizen voice and power while the latter stresses social action and change. Now participatory research has splintered into many types with methodological, epistemological, and political differences, all slightly different yet running under the participatory banner (Kindon et al. 2007b). For some researchers, adding 'participatory' to action research is seen to be the most politically correct way of putting it. Others do not see the point in 'action', as emancipation and transformation are a given, while others specify the 'action' to emphasize the importance of creating change. Whether it is called PAR, P(A)R, PR, AR, or CBR seems to depend on where the emphasis is placed. Everyone who enters into participatory research puts their own spin on the definition, adapting it to the discipline and location. This explains why no two definitions are alike yet they all share nearly identical goals.

What is agreed upon is that any participatory research must lead to improvement within the community, whether through education, action, social change, or all three (Macaulay et al. 1999). Also, participatory research is done *with* the community, not *on* them, as an ethical and collaborative effort with their involvement in as much of the research as possible (Cahill et al. 2007; Cornwall & Jewkes 1995). Participatory research recognizes the importance of action and reflection, theory and practice in dealing with issues that are of concern to the community and that research can make a worthwhile contribution. This project is community-based participatory research (Hergenrather et al. 2010), emphasizing working with the community on a specific issue and working to give voice to more people in more ways with less emphasis on creating change and more on promoting understanding and educating.

In the past, a participatory relationship has meant everything from full partnerships, to consultation, to outright exploitation (Ife & Tesoriero 2006). The term 'participation' has been highly misused, often as a moniker to make less legitimate research sound community-based and supported. For this reason, it can be useful to understand the gradations in participation and collaboration as levels. Arnstein (1969) was the first to categorize degrees of participation in her Ladder of Participation. This ladder has since been taken on and adapted by many participatory researchers and serves as a quick guide on whether research is truly 'participatory'. Participation is more than just involving the community, but means sharing the entire process from the conceptualization through to the evaluation, and giving ownership to those involved (McTaggart 1991). Communities favour what Arnstein would likely consider 'good' participation, which:

> *Is a powerful change mechanism; it builds individual and community capacity and confidence; it challenges an alienating and bureaucratic system; it fulfills social obligations and gives a sense of contribution; it empowers people and communities; it is good as an end in itself* (Ife & Tesoriero 2006, p.152).

Participatory research is situated and reflexive; is highly concerned with justice and fairness. However, participatory research can be difficult to fit in a normal academic setting since it relies on outside forces, works on its own schedule and is often criticized

for being biased. It requires relationships and flexibility (Bringle & Hatcher 2002; Brydon-Miller et al. 2003). During the research I take on a mixed identity of, one part student researcher, one part community volunteer and cannot maintain sole custody of the project. McTaggart (1991) explains, "participatory action research is a systematically evolving, living process changing both the researcher and the situations in which he or she acts " (p.181). In terms of maintaining relationships, Macaulay et al. (1999) recommend drawing up research agreements from the beginning that cover design, implementation, analysis, and dissemination and ownership of results. Others have published guides on maintaining 'good practices' (Rambaldi et al. 2006b).

After being approached by the museum, our partnership began with a frank discussion of what this partnership would look like over time. The research team offered my time and skills as a museum assistant as well as ultimate control over the mapping tool, which we agreed to create to meet their needs. They provided the necessary contacts and information to make the interviews successful and informed. Ultimately, the members of the museum were interested in the tool but they understood the importance of interviews from our perspective. Fortunately, tensions between "'practically oriented' community partners and 'theoretically oriented' students or faculty" (Breitbart 2003, p.175) were minimized by this opening discussion with the museum director. We fully expected some turbulence in merging academic and community interests; but, by being prepared and clear, these problems seem to have been mitigated. Our ultimate goal, as Bringle and Hatcher (2002) suggest was to "find ways to preserve the integrity of each partner and, at the same time, honor the purpose of the relationship and the growth of each party" (p.513).

In encouraging participation, participatory researchers "strive to diminish their own expert status, valorize the expertise and perspectives of participants, and recognize and subvert the power relations that usually structure research" (Kesby et al. 2007, p.20). However, there is dissent on how participation is framed in participatory research. Many researchers have contributed to discussions of power relations, practicalities of participation, and the possibility for misuse of participation (Cooke & Kothari 2001; Ife & Tesoriero 2006; Kesby 2005; Kesby et al. 2007; Pain 2004). The dichotomous view is that participation can be genuine or token, empowering or tyrannical. By treading

carefully, participatory research can be created that recognizes power relations while at the same time serving as a resource for communities, facilitating reflection and social transformation (Cameron & Gibson 2005; Hickey & Mohan 2004; Kesby 2007).

This community-based participatory research strove to encourage better and more personalized campus-community relations and became a fulfilling relationship that I will carry on even after the research is complete. Through this project, we have been able to design, create, and host this online tool to facilitate public participation and also help store museum data in a more accessible way. While we were interested in broader ideas of participation and motivation, our partner society still had tangible research results and gained a new volunteer from the experience.

4.4   The Fire History mapping interface

Findings from the pilot study and our research agreement with the Kelowna Fire Museum necessitated a re-conceptualization of the research project that allowed for more inclusive and collaborative research. With direction from the previous project we set out to focus on a specific fire and work with the museum to involve a smaller but more engaged group of users. The project began with a meeting with the museum director to view the pilot map and to discuss new functionality, audience, and purpose. The final map was one that both parties were satisfied with and that succeeded in being visually stimulating, not overly complex to use, and capable of serving its purpose of collecting publicly volunteered information about the fire.

The overall format of the map was not changed from the pilot project, we opted to take advantage of Geolive once again and use the same photo uploading, as well as the temporal navigation graph along the bottom that had exhibited so much promise before. The visual appearance was improved and the website was modified to be as simple as possible (Figure 4.1).
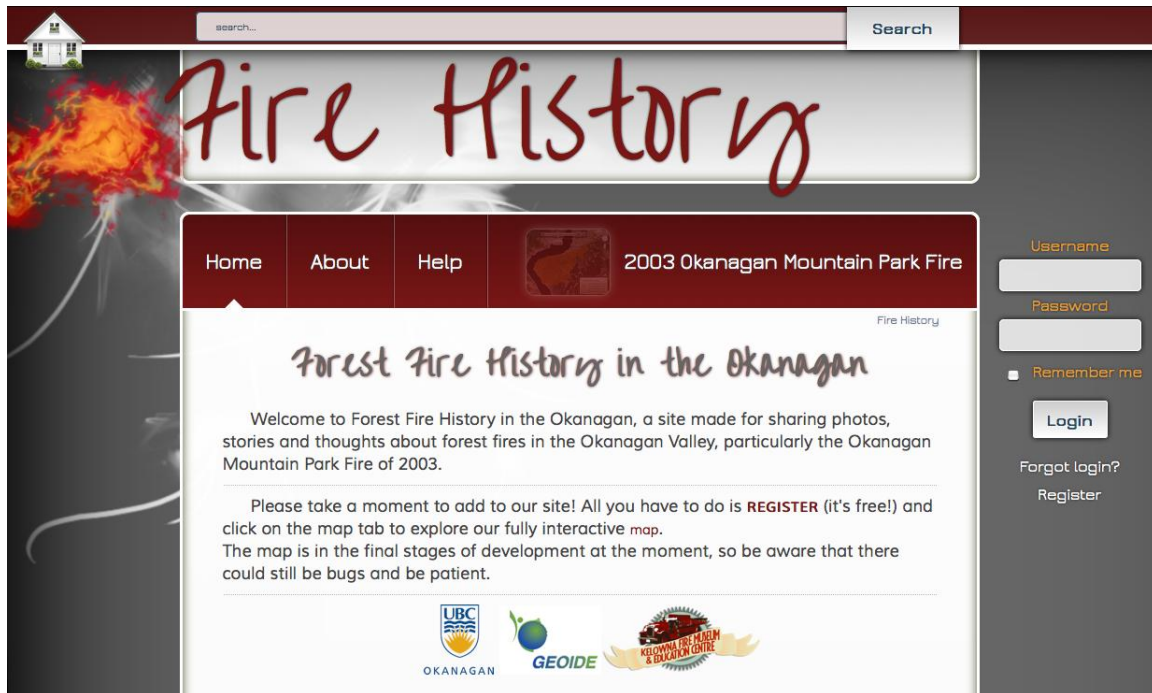
Figure 4.1: Fire History home page
Source: http://firehistory.ok.ubc.ca/

4.4.1   The Fire History site

This section describes the Fire History Geoweb tool created at http://www.firehistory.ok.ubc.ca and its functionalities in more detail. When reaching the Fire History webpage, there is an initial welcome page, which leads straight into the map with an "About" and "Help" page. The "About" page provides basic information about the project, the 2003 forest fire season, and the Okanagan Mountain Park Fire. For the museum, this is important in the educational aspect and is an ideal resource for schoolchildren doing projects. The "Help" page was added to assist users in understanding the functionality of the site. It explains the purpose of different buttons on the map and how to add map markers and information. We attempted to make the help as accessible as possible in terms of language. The final tab is the link to the map.
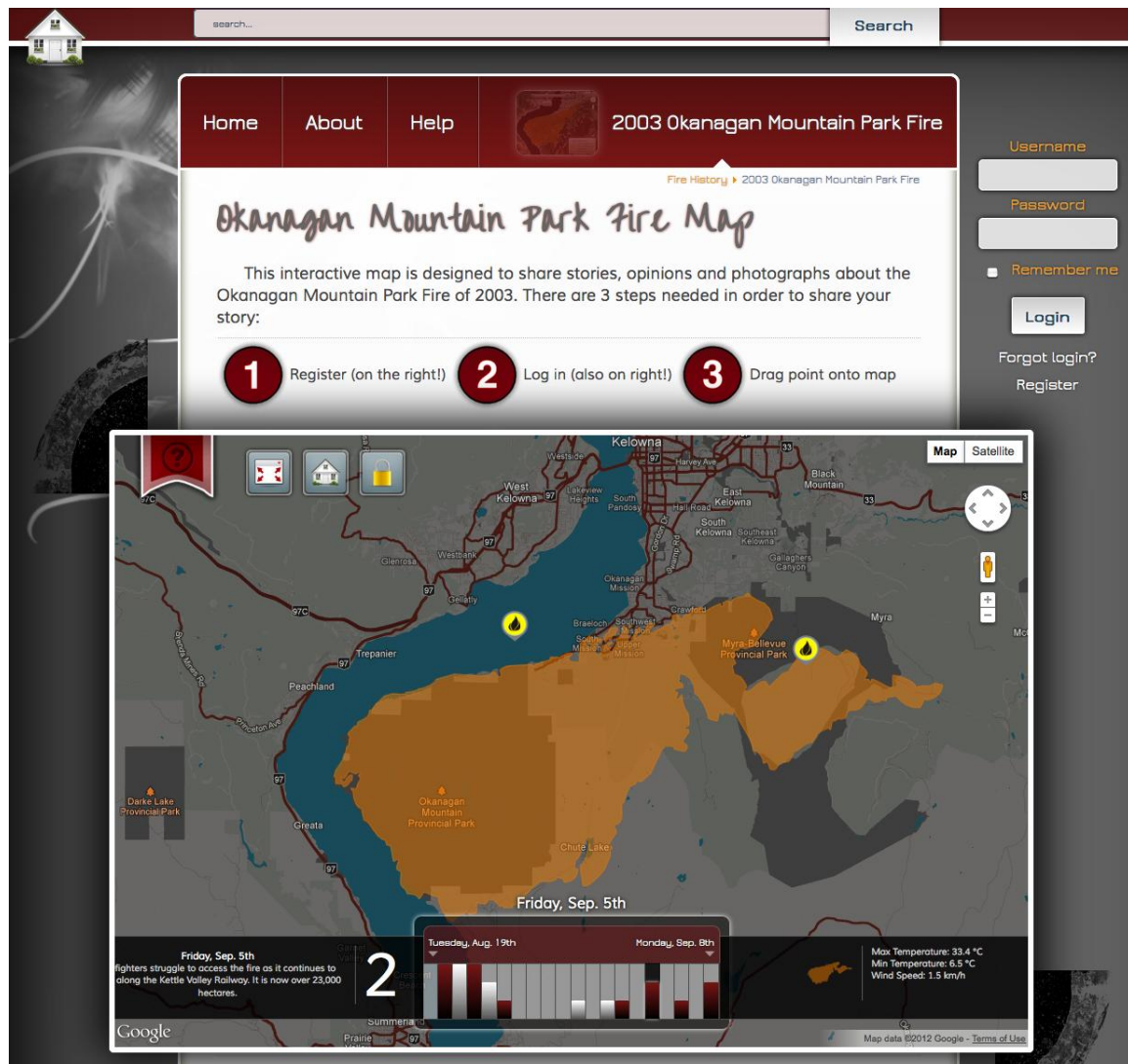
Figure 4.2: Fire History Okanagan Mountain Park Fire map
Source: http://firehistory.ok.ubc.ca/index.php?option=com_mediamapserver&view=map&Itemid=6

The pilot study found that users wanted to see the map immediately with minimal text on this page. To encourage users to be less passive and place points, we added a large 1, 2, and 3 with the three steps of creating a point. There is a login/register button on the map and on the right side of the webpage.

The visual style of the map was influenced by our desire to make the map as visually appealing and attractive as possible using a grey pallet for the map and bright red for the roads. The grey map contrasts well with the yellow and red marker points that are added by users. The timeline bar across the bottom of the map (see figure 4.2) has also been optimized with additional meteorological information added for every day of the fire. This data on the map comes from the daily remotely sensed images of the fire

perimeter from AWIS, the remote sensing organization that originally provided the images used by the fire crews and government. The perimeters presented on the map had all been merged into one layer. They had to be separated using Photoshop. Of the 21 days that the fire burned, there were 19 different flyover layers recorded. Almost all of them were taken at the same time (very early in the morning), making it fairly representative of the daily expansion of the fire. With the first flyover on August 19th, we also felt it prudent to place a polygon for August 16th for users of the site who would want to see the first day of the fire on the map.

Each of these 20 polygons represents the geographic extent of the fire on a certain day; the different days are accessible from the time bar graph. The height of each column in the bar graph (see Figure 4.2) represents how many user points have been added to that particular day. After initial consultations with the museum we became aware that many people could not remember what day events occurred during the fire. Asking someone to place a point about an event that long ago is difficult and for this reason, each date has a sentence or two stating what was happening on that particular day. For example, the Monday September 1st entry summarizes: "The fire is still expanding, but at 6.1 ha/hr. Later in the day the fire will cross fireguards and 3,000 people will be evacuated again". This is meant to assist in the memory of users by providing clues as to when various events happened.

As with the pilot study map, we believed the key to encouraging participation was to make adding map markers and information to the map as simple as possible. While website registration is necessary to prevent spam and other inappropriate postings, we simplified the process, asking for just a username, name, password, and valid email address. The process of adding points was also streamlined so as to be straightforward. When logged in, the user simply has to drag the icon to wherever they would like to place their point. From there they are prompted to add a title, text and photographs (which can be uploaded to their own specific account). When they finish, the point is instantly available and allows for other users to add their own comments easily and quickly with a large "Add a Reply" button below each entry (see Figure 4.3). This drag and drop style of point creation seemed the most user-friendly method.

Figure 4.3: Fire History Okanagan Mountain Park Fire Map – August 19th
Source: http://firehistory.ok.ubc.ca/index.php?option=com_mediamapserver&view=map&Itemid=6

In discussion with the research partners, we made the decision to differentiate between firefighters and members of the general public. When registering, there is a yes or no question that asks whether or not the registrant is a firefighter. The site administrator and the museum verify this, and it gives firefighter's posts an expert distinction. Firefighters' posts appear as a red icon resembling the firefighter's badge and other members of the public's posts appear as yellow flame icons (visible in Figures 4.2 and 4.3). Although other "experts" (the RCMP, Emergency Social Services etc.) could have been uniquely identified as well, too many different statuses and types of posts was deemed potentially confusing and we limited the scope of the project to one group, firefighters.

Our experiences from the pilot project survey recognized how it was essential for the site to be as error free as possible to encourage users. If the website does not work flawlessly, then feedback will be overwhelmed by specific technical complaints detracting from the ability to engage with the broader questions related to participation.

4.5   Research tools

Understanding the collaborative and qualitative nature of this research, I will now explain the specific research tools used to understand individual motivations to volunteer to this Fire History mapping tool. This section will begin with a justification and explanation of sampling procedures followed by a discussion of access and recruitment (4.5.1). I will then explain the choice of setting and methods of data collection: within this section (4.5.2) I will detail broader interviewing techniques as well as more specific guidelines of interviewing that were carried out. Next I will present the rationale for data management, coding, and data analysis procedures (4.5.3). Finally, I will consider issues of rigor and validity (4.5.4).

4.5.1   Sampling and recruitment

Quantitative studies are concerned with being generalizable and tend to require large samples. However, theory guiding qualitative inquiry rejects this idea of generalizability-as-necessity and promotes more case-based studies, that provide a glimpse into one instance and are not meant to be applied elsewhere (Marshall & Rossman 2011). This negates the issue of sampling and sample size as participants no longer need to be randomly chosen to exhibit 'normalcy', but can be selected specifically for certain traits or experiences that other fields would consider bias. As Higginbottom (2004) notes, "sample size is not determined by the need to ensure generalizability, but by a desire to investigate fully the chosen topic and provide information-rich data" (p.14). Sample sizes can also be much smaller since results are no longer intended to apply to a larger population, and vary depending on topic and methodology (Mayan 2009). Study samples are flexible and emergent and cannot often be predicted at the proposal stage since, "the greater the amount of usable data obtained from each person… the fewer the number of participants" (Morse 2000, p.4).

This study utilizes a mixture of purposive and snowball sampling methods. In the pilot we learned that encouraging participation without community assistance was not an effective strategy at encouraging users to contribute to the site, and that partnering with a local organization was a more ideal way to access participants. Working with the museum, we began by purposefully begin sampling members of the Friends of the Museum society. The museum director initiated contact for a group of participants. We

selected individuals from different backgrounds and social circles, including firefighters, teenagers, and older community volunteers. From this initial group, we used snowball sampling, which "identifies cases of interest from people who know people who know what cases are information rich" (Marshall & Rossman 2011, p.111). The selection progressed logically; certain key individuals involved with the fire were suggested many times. Consistently, each interview yielded new contacts. While the initial group was purposeful, the study spread to include a broad group of affected people whose only link to each other in some cases was the fire. In order to be interviewed, potential participants had to self-identify as being affected by the 2003 Okanagan Mountain Park Fire and had to be over the age of 16. Each potential participant was either emailed or telephoned first at the recommendation of the director. That contact email included the text from the recruitment letter (Appendix B) and was almost identical for each person but modified slightly to make them more personalized and hopefully less easy to ignore (Marshall & Rossman 2011). The participant recruitment email also included a statement of informed consent (Appendix C), a data release form (Appendix D), and the URL for the website. Interested parties could arrange a time for the workshop, which I conducted.

In this research we anticipated a relatively small sample of five to eight participants due to the limited scope of the study, ease of information gathering, and quality of observations; each of these factors reduced the required sample size (Morse 2000). This study did not seek to be generalizable and was instead focused on one case study and therefore had a narrow scope. The topic is also one that participants have had time to consider. Most potential informants proved comfortable, even eager, to talk about the fire. I found that during interviews it took little time to ease into the topic and that participants were very forthcoming. Finally, data quality was high because participants had already considered the topic in many ways and were prepared for these meetings and accustomed to talking about the fire. Most participants had reflected on the topic and proved highly articulate, experienced, and willing to share. I provided the URL for the online tool in advance, and most participants had visited the site and arrived at the interview-workshops with a pre-awareness of what the tool was and were prepared to explore and discuss it further with me. One participant even arrived with a list of notes on the website that he took me through. Overall, results were closely related with

participants reporting many of the same issues. I interviewed six people, and found many of the same themes re-occurring. Participants were able to answer for themselves and for others and after interviewing all six, I felt I had enough data to authoritatively answer my research question and reach a clear set of conclusions.

4.5.2 Setting and data collection

We were selective in considering the location for these interview-workshops. We required a setting that was convenient for participants and was a comfortable space for conversation without interruptions (Warren 2002). We also had technical requirements, needing not only a computer but also reliable Internet access. UBC Okanagan was quickly discarded as a meeting place because it is far from town, holds little interest to participants, and its demeanor could be perceived as overly official and intimidating (Bringle & Hatcher 2002). The Kelowna Fire Museum provided an ideal meeting place. Although not yet open, the museum is located in the downtown area and is for these participants central, familiar, and less intimidating. It also has parking. This was the ideal space for the interview-workshops since participants were curious to see the museum and going there for interviews provided a 'sneak peek'. In addition, the coffee shop was designed to be reminiscent of the firefighters' lunch table where participants interviewed were comfortable talking in an open manner. The area is well lit, inviting, and has several computers as well as Internet. While this was our meeting place of choice, participants who wished to meet elsewhere would be given the option to suggest somewhere else that they were comfortable or that was more convenient for them to meet. Of the six interview participants, five met at the museum where we discussed the map and the broad themes of the research project.

For this research, data collection is perhaps an inappropriate term. Instead I consider data to be something that is created both in terms of adding content to the online tool and as a document of the collaboration between the researcher and participant as they co-navigate their way through the website and their impression of participation. While this could take place through a number of media, conversation was ideal. As Rubin and Rubin (1995) state:

> *At a basic level, people like to talk about themselves: they enjoy the sociability of a long discussion and are pleased that somebody is interested in them.... you*

come along and say, yes, what you know is valuable, it should not be lost, teach me, and through me, teach others (p.103)

In many one-to-one interview techniques the researcher maintains control and power of the questions and the conversation with the participant speaking when told (Mayan 2009). While many interviews follow strict guidelines and can be highly impersonal and rigid, unstructured interactive interviews give participants more control (Corbin & Morse 2003). In these interviews, "participants are more likely to be viewed as meaning makers, not passive conduits for retrieving information from an existing vessel of answers" (Warren 2002, p.83). Typically in an unstructured interview, the participant is asked one 'grand tour' question and the participant can choose where to start, what to include and exclude, how they are presented, and the amount of detail to provide (Corbin & Morse 2003). Adaptability and maximum control by participants is embedded within the philosophy of community based participatory research and for this reason we opted to make our interviews as loose as possible further probing with questions that we could ask if the participant needed cues (Appendix E), but otherwise presented themes that we steered the participant towards talking about.

Meetings with participants would begin with a workshop-style introduction to the online tool. Since they were already sent the URL in advance, for many this was a refresher. With the participant controlling the computer and myself beside them I steered them into testing the various functionalities of the tool and took notes on their usage, something that would not be apparent from an audio recording. Once this exploration of the tool was complete, we turned to our interview, for which I had a loose guide with some sample questions (Appendix E). In crafting the interview questions we sought to explore first, how the participant was affected by the Okanagan Mountain Park Fire. This was meant to serve as an opener question, participants appeared very comfortable, even proud, to speak of their experiences. From the opening the discussion moved towards the mapping tool and discussing its strengths and limitations before turning to more usage-type questions. I asked them what purposes they saw this map as having, what effect the technological aspect had on their participation, and whether they felt the tool was worth revisiting. These meetings with the workshop and interview portions lasted anywhere from 40 minutes to over an hour. These discussions guided us in attempting to determine

what influences an individual's willingness to volunteer their experiences of the Okanagan Mountain Park Fire. This style of interviewing was meant to be highly flexible, moving from one topic to the next as the participant dictated. My participation was to keep the interview on-topic by asking and sometimes reframing the main questions, presenting probing questions to clarify, or follow-up questions intended to explore some of the larger implications of answers (Rubin & Rubin 1995).

Participants remained in control of the computer as well during the workshop portion of the meeting, choosing where to click and what to linger on. I was interested in how participants would interact with the online tool. This portion of the meeting involved observation on my part, examining whether people were more active or passive users by assessing their engagement levels with the various aspects of the website, with myself compared to the website and evaluating their interest in adding material to the map. These observations were important in assessing where the tool succeeded and where it faltered and recorded what participants clicked on, what they ignored and, where they lingered. I elaborated on these short-form notes from the workshop and interview in my research log, where I recorded every step of the research, creation of the website, and management of the partnership. As Mayan (2009) suggests, this research log described my "reflections, feelings, ideas, moments of confusion, hunches, interpretations, and so on, about what is observed" (p.77).

Before the interview-workshop, I went over consent forms with the participant to be assured of fully informed consent, explain confidentiality, and lay the groundwork for reciprocity through small talk about the larger project. Although participants had already received these forms, it was important to go over them in person. I also explained that this research was for both UBC Okanagan and the Kelowna Fire Museum and Education Centre. The main consent form (Appendix C) clarified the purpose and subject of the study as well as re-established that participation was voluntary and could be withdrawn at any time. Having participants recount victimizing experiences can be difficult, but given the time that has passed and the clear and understanding way the research was explained prior to the interview-workshops, the risk for harm was extremely low. Corbin and Morse's (2003) experience interviewing past victims is one where participants enjoyed revisiting old memories and I found this to be the case as well. The second form

(Appendix D) established that information being added to the online map would be freely available on the Internet and out of the researcher's and participant's control. Once the participant signed these forms, I would ask permission to audio record. Although tape recorders make some participants uncomfortable and can alter the dynamic (Warren 2002), it is still the best way to maintain accurate notes while following the conversation, allowing for later transcription. I started interviews with broad questions about how participants were affected by the fire going from a more tentative introductory stage to a more immersive story-telling stage (Corbin & Morse 2003) and discussing the online tool in detail.

Once we covered the main points, the interview wound down and I asked participants if they knew others that I should approach. I attempted to ensure that interviews ended with both parties feeling comfortable and composed and that they understood my gratitude and felt as though their insights were valuable. I hoped that participants appreciated having this opportunity to express their feelings and memories surrounding the issue through the online tool and having the opportunity to speak about these experiences.

Immediately after saying goodbye to participants, I made notes in my research log. These were general notes on the person, my interaction with them, and then more in-depth notes on my impressions of their use of the online tool and their general level of interest expanded from my short hand notes. The day after the interview every participant was emailed to thank them for their participation and to remind them that they would have access to the website from anywhere and access to the completed thesis.

4.5.3   Data management and analysis

Aside from the interviews, another main concern was proper data management before, during, and after the analysis stages. As per research ethics board requirements, all data will remain confidential and will be kept for five years before being destroyed. During the study, data was stored as paper notes, audio recordings, and computer files. Paper notes had no personal information on them and were stored in a locked filing cabinet. Audio recordings and other computer files were transferred onto a password-protected computer. The only people with access to these files were my supervisor Jon Corbett and myself. To a limited extent the museum had access to data as well. Online

data could be linked to an individual, but confidentiality was not promised online and participants were made aware of the potential risks of having their data online, which for many are now commonly understood. By ensuring that all data was filed properly throughout the research, I found it easy to transition into transcription and analysis with no lost data.

Analysis is "messy, ambiguous, time-consuming, creative, and fascinating" (Marshall & Rossman 2011, p.207). It is a process of description, analysis, and interpretation, but not a linear process. In determining what factors influence an individual's willingness to volunteer their geographic experiences related to the Okanagan Mountain Park Fire, my transcripts and field notes were analyzed together and constantly revisited. The analysis began with transcription, following through to data familiarization and coding. The resulting codes sorted interview data into clear categories, which were used to answer the research question.

As soon after each interview as possible, I began transcription and analysis. The transcription was as precise as possible and was integrated with my research log where I recorded my observations and hunches as the research progressed. By analyzing, transcribing, and interviewing simultaneously I was able to adapt the research and retain the flexibility inherent in my entire research ideology. By taking the time to analyze throughout, when one person said or did something unexpected I was able to test it against other participants and thus remain open to unexpected and new results (Mayan 2009).

Through discussions with my supervisor and interactions at the museum, we identified three main preliminary categories that would guide the coding and were flexible enough to allow more codes to emerge from the data. These preliminary codes would evolve into broader categories and subcategories as the data collection continued. The idea was not to count specific words or ideas as used in manifest content analysis (Mayan 2009) but to provide room for context or variations and something more than statistics. The preliminary divisions are based on my three primary points of discussion during the interviews: *discussion of the fire itself*, including anecdotes, stories, and emotions surrounding the fire; *comments on the strengths and weaknesses of the online map*, which were more specific and easily evaluated; and, *more abstract information*

about the purpose of the map, including motivations to participate and general interest levels. Although only the third category directly answered the research question, the others helped illuminate the reasoning behind these conclusions.

The first step in coding was to read the transcripts with my notes and become familiar with the data. Coding is the process of determining what is important and what should be let go (Mayan 2009), taking a mountain of data and mining out the particular gems that shed light on the research question. As I became familiar with the data, certain themes began to emerge. With each reading I was able to add more memos on emerging concepts, and potential categories and subcategories. As Marshall and Rossman (2011) write, "Identifying salient themes, recurring ideas or language, and patterns of belief that link people and settings together is the most intellectually challenging phase of data analysis" (p.214). Working by hand instead of through a qualitative software program was time-consuming, but given the relatively small number of interviews, it was easiest and allowed me to get closer to the data. The broad-level categories were concerned with human impacts of forest fires, the more tool-specific suggestions or changes, and finally the more user-specific questions about participation and interest.

Examining these initial categories, I began a process of cross-checking; ensuring that data was both internally similar and externally different between categories. Some categories were dissolved, re-labeled or split to ensure that the differences between them were clear and similarities within categories were equally clear (Marshall & Rossman 2011). I tried to be critical of patterns or categories, seeking other explanations or linkages so that the ones that stuck were likely the most plausible. Once I reached a point where concepts began to fit into the categories and themes, I began to critically engage the data. "Interpretation brings meaning and coherence to the themes, patterns, and categories, developing linkages and a story line that makes sense and is engaging to read" (Marshall & Rossman 2011, p.219). From these categories and through interpretation, I was able to determine the broader themes within results. As Mayan (2009) explains, "Theming is the process of determining the thread(s) that integrate and anchor all of the categories. To form themes, the researcher returns to the 'big picture' level and determines how the categories are related" (p.97). Theming is a circular process whereby if one anomaly could not be explained I returned to the categorization process or my notes to

resolve it. The difficult part was remaining open to changes throughout the entire coding process (Mayan 2009). In deciding what to keep and what to discard from the transcripts, choosing categories, and dividing data into them I actively controlled how my research question was answered. To ensure that this research design is defensible, I now turn to a discussion of rigor and validity.

4.5.4   Rigor and validity

Quantitative researchers use rigor and reliability to assess the legitimacy and importance of research. Historically, the key determinants of validity are the abilities to generalize results and replicate the research (Guba & Lincoln 2004). However, qualitative researchers assert that rigorous research can exist outside these more positivistic bounds (Cho & Trent 2006; Guba & Lincoln 2004; Lincoln 1995; Marshall & Rossman 2011; Mayan 2009; van der Riet 2008). These researchers fight the ontological assumption that there is only one truth and consider this definition of validity misleading and inauthentic (Lincoln 1995). Qualitative validity is more flexible, recognizing that validity differs depending on the purpose of the research. In considering validity in my research I must "explicitly consider the degree to which the research purpose, question, and actual acts intertwine with an embedded, process view of validity" (Cho & Trent 2006, p.327). Key in understanding validity in relation to this research is an understanding of participatory research.

Participatory research methodologies can actually enhance validity simply through their collaborative, local, and lengthy nature. As van der Riet (2008) asserts:

PR [participatory research] processes clearly contribute to the validity of social science research beyond the concerns of social justice. They address the participative, relational, and social nature of human action, enhancing validity because of the way in which they enable social science researchers to understand and interpret human action (p.562).

Participatory research embraces multiple knowledges and brings more people into the research process, which helps ensure that one persons' perspective does not dominate the reading. Findings are approached from different perspectives by different group members and are understood as a group. Also, the emphasis placed on good relationships creates respect and trust and is likely to enhance the quality and honesty of data (van der

Riet 2008). This is especially true when participants have a stake in the project, since it has a life beyond academia and is actually being applied in the community. Finally, participatory research emphasizes local knowledge and local knowledge creation and further validates local knowledge claims.

It is through this idea of a participatory validity that I approached my findings, focusing on the quality of my interpretation of the data as well as the broader relevance to the local community. Good research is "dependent on how it engages in significant, socially valuable work, and its enduring consequence" (van der Riet 2008, p.559). Because of the highly dialogical nature of research, the high levels of collaboration, and the value I place on locally produced knowledge, my standard for ensuring validity included member checking. This involved interacting with research partners to discuss findings, revisit facts, feelings, values, and experiences to determine the certainty with which we can make claims about our data. It is not a process of questioning the data, but shedding light on my interpretation of the data to ensure it is what the participants intended: what Guba and Lincoln (2004) consider assessing 'trustworthiness'. Although research participants were not interested in individual member checks, I did meet face to face with the museum director and my faculty supervisor to discuss findings and evaluate the overall study.

This member checking examined not only the research conclusions against our own knowledge and experience with the research but also looked for congruency. Methodological congruence is a process of reviewing to ensure that my ontology, methods, and questions are complementary. The key ideas of this research involved dialogue, collaboration, and co-creation of knowledge and they fit within a participatory community based research framework and were maintained throughout the research.

The other main strategies employed to promote rigor and validity were prolonged engagement and personal reflection, both essential in participatory inquiry. Prolonged engagement in the research setting helped me avoid jumping to conclusions, over-generalizing and, with my research log, greatly enhanced the validity of my findings, allowing me to self-check by revisiting assumptions and perspectives that could have clouded the findings.

Although descriptive and locally based research such as this is non-transferable, it is nonetheless of value, especially within the community it was co-created. The research remains fully congruent, committed to participation, collaboration, and dialogue. It incorporates collaboration throughout, allowing it to serve as a mode of member checking which, when coupled with my prolonged engagement with this community group and my meticulous care to self-evaluate ensures research that is valid. From this defense of validity and rigor, I now move into the consideration of ethics, which remain as co-navigated as the issue of validity.

4.6   Ethical considerations

Ethics are the principles and rules that researchers use to gauge their actions and intentions to determine right from wrong, and to engage in research that had positive impacts for everyone involved (Tri-Council Policy Statement, 2011; Tri-Council Policy Statement, 2010). Although there are basic ethical ideals that are laid out by research ethics boards, participatory research has its own set of ethical considerations above and beyond those of traditional research (Cahill et al. 2007; Elwood 2007; Manzo & Brightbill 2007; Pain 2004; Pain et al. 2007). For this research, we made a clear decision to fully adhere to institutional ethics and to move beyond them into participatory ethics.

Institutional ethics have three main ethical principles to adhere to. The first is respect for persons, or beneficence, which implies that people ought to be treated as autonomous agents and those that have diminished autonomy deserve to be protected. The second principle is to do no harm while maximizing benefits to participants, society, and humanity. Risks and benefits are balanced and distributed equally among participants. The final principle is justice, to treat everyone as equals and ensure that research is non-exploitative. Research ethics boards distill these broad principles into policies and regulations (Tri-Council Policy Statement, 2011; Tri-Council Policy Statement, 2010). Participatory research adheres to the same main three principles but does not interpret them the same way that institutional ethics boards do; this is the root of the problem between participatory and institutional ethics.

Participatory ethics are co-negotiated, fluid, and constantly re-approached as research evolves (Cahill 2007; Cahill et al. 2007; Elwood 2007). They remain "rooted in assumptions that ethical problems and dilemmas are situational, specific to the

relationships and interactions of a particular research context" (Elwood 2007, p.331). It encourages researchers and participants to self-manage their conduct to ensure it remains ethical and maintain good practices (Rambaldi et al. 2006a). Participatory research also maintains that research that 'does no harm' is not enough. Research should make change and strive to be more than a corporation of knowledge maintaining the status quo (Pain et al. 2007). Instead, participatory research should "strive to address unequal relations of power, open up new spaces for decolonized knowledge production, and challenge the dominant hegemonic paradigm" (Cahill et al. 2007). True participatory research should not leave the community the same as it came in but should make lasting positive change (Pain 2004). Participatory ethics also add a fourth ethical pillar: that of an ethic of care, which emphasizes empathy and relationships rather than objectivity (Manzo & Brightbill 2007). This is important because this type of research forms such close relationships.

While participatory and institutional ethics can work well with one enhancing the other, they can be incongruent in certain contexts. "These [research ethics requirements] have become more formalized over the past several decades, to the point where some say they unduly constrain the conduct of social research or protect the researcher more than the subjects of the research" (Warren 2002, p.88). The key issue is institutional ethics boards that require researchers to "design research in its entirety (including all methodologies and tools) before a single participant is recruited" (Manzo & Brightbill 2007, p.34). This assumes linear, non-collaborative, and unchanging research, which participatory research is not. Ethics are not to be considered once and then ignored. In such flexible and adaptive research it is "difficult, even impossible, to declare every ethical issue to a review board before research begins" (Manzo & Brightbill 2007, p. 35). Research ethics boards assume that power relations are of a certain type and are virtually unchanging. Elwood (2007) discusses how institutional ethics can actually be unethical. For example, a confidentiality clause is often a requirement for ethics boards when the participants want to claim ownership of their own work (Cahill et al. 2007). However, confidentiality and anonymity can actually stifle participant voice. Consent forms spell out risks and benefits and that research is voluntary but releases the university from responsibility (Cahill 2007, p.366). Discussions on institutional ethics and their relation to participatory ethics demonstrate the problematic nature of reconciling these different

ideas with their alternate way of viewing participants (Cahill 2007; Cahill et al. 2007; Corbin & Morse 2003; Elwood 2007). Manzo and Brightbill (2007) suggest re-worked notions of representation, social accountability, responsiveness, agency, and reflexivity that allow participatory researchers to be self-reviewing constantly.

For this research we strove to follow the institutional ethics as closely as possible and expand from there as needed to ensure ethical treatment of partners and participants. We strove for a close relationship with the Kelowna Fire Museum and Education Centre, one where all collaborators could agree on goals, objectives, methods, terms, and data based on the ethic of care and where ethics were co-negotiated (Cahill et al. 2007; Manzo & Brightbill 2007). The aim was to build the capacity of both groups and be cooperative and open throughout, something that does not always occur in these types of research (Bringle & Hatcher 2002; Macaulay et al. 1999). In this study, we struggled less with anonymity issues because the Kelowna Fire Museum and Education Centre did not need interview participants to be named, furthermore they could choose whether to be anonymous or not when adding to the online tool. Institutional ethics required that we warn all participants about the risks of posting identifying information online and each participant had the choice when creating an online username whether or not to remain anonymous.

The main concern of institutional ethics is informed consent, which was assured through the consent forms as well as verbal iteration. All participants understood that their participation was voluntary and that for the interview portion, anonymity was guaranteed. I made all the necessary precautions in data storage and collection so that participants could remain anonymous and any identifying information was removed from the research. Participants who wished to identify themselves could do so through their contributions to the online tool. Participants were made aware that whatever they added to the online tool was publicly available on the Internet. They were also asked what they hoped to gain from these meetings and every effort was made to fulfill these goals. For example, a reporter that I interviewed wanted to write a story about the project. This is a win-win, gaining publicity for the project as well as getting a story for the reporter. For other participants the emphasis may be motivated more by the ideal of sharing and story telling rather than simple dissemination of information.

As part of the project's ethics and commitment to social change, the interview results are freely available to participants and the online map will remain in the control of the Kelowna Fire Museum and Education Centre. To honor our commitment, the university will continue to host and manage the Fire History website for at least three years after the research is complete. Participants will be emailed a link to this thesis when it appears online. They have also been given contact information in case they have any questions or concerns once the thesis is made public.

5.   Discussion

Using the research methods described in Chapter 4, including unstructured interactive interviews and participant observation, this study reveals several major findings relating to influences on participation concerning the Fire History mapping project. Since the emerging themes and broader discussions were such a part of the results, I chose to fold the results and discussion sections together to eliminate unnecessary repetition and encourage a fuller discussion here. This first section evaluates the map as the medium and examines whether online mapping encourages or limits willingness to volunteer geographic information. This discussion will cover the technological concerns of participants, it questions whether non-digital mapping techniques would be preferable, and will conclude on the usefulness of the mapping tool itself. The second section will focus on other factors of participation including individual participant's interest in the issue, the case of too much information, and marketing. The final section will focus on participants as experts, how readily they were willing to be considered experts and how easily they applied this label to others. In this discussion I will conclude on how these factors influenced participants' willingness to volunteer their experiences related to the Okanagan Mountain Park Fire through the Fire History mapping tool.

5.1   The map as the medium

The research team sought to implement this research in a manner as open as possible, and part of this approach included assessing whether the tool itself was actually limiting engagement. We avoided any assumptions that an online map was the best approach, asking research participants whether a forum or discussion would suffice without the mapping aspect or whether a paper map would be better to eliminate any issues with the technology. During interviews, I attempted to seriously question the role of the map and challenge participants to see how far they would defend it. We determined that participants were extremely supportive of a map but less married to the technological requirements. Several participants had technical difficulties or had lower than anticipated

map literacy. Despite this, they all agreed that the online map was the ideal medium for this project.

Initially, participants reacted to the map in a positive way, expressing that it was "pretty" (Participant 1), "a great idea" (Participants 3 and 5), and "awesome" (Participant 4). Participants were mostly interested in the map, going directly to it and immediately interacting with it. Most barely read the front page, did not click on the "About" or "Help" pages, and went straight to the map. Although everyone needed a quick explanation of what the map was (I had to explain the timeline on the bottom to all but Participant 4) they immediately began moving through the timeline of the fire. "When you look at a map with all the colours, like it is here, it's really quite amazing" (Participant 1).

The map allowed viewers to immediately assess the size, movement and speed of the fire as it varied over the 21-day period. As Participant 4 stated: "seeing it like this, you can see how much it grew. Obviously I know it was big and it was a big deal but to visually see it…" Despite their existing knowledge of the fire, which varied but was generally fairly high, participants still found new information about the fire. For example, when examining the map after August 22nd, 2003, Participant 5 remarked, "It's not really moving much [sounds surprised]. Isn't that interesting?" The timeline also provided guidance, moving the participant through a more coherent story instead of providing a static image; "you have the timeline at the bottom so it's not like 'hey, here's a map, this is what happened.' It's step-by-step, 'this is what happened'. And you can see it growing" (Participant 4). Other additions, like the daily descriptions of what happened were also well received, "I like the fact that if I just click on that rectangle I get the day and I get a synopsis of what happened that day" (Participant 5).

The day-by-day map was sufficiently engaging to keep participants brimming with stories and they were eager to move through the days, remember their own experiences, and express them freely. Once I explained and showed participants the publicly added points and how they worked, they were interested. Participant 4 was particularly interested in these map-mediated discussion points:

People can comment on those posts so I think that flows a discussion too.
You know what people are talking about. It's a continuous flow, kind of….

People could say, 'oh, this happened at Cedar Mountain'. Well then
people are going 'where the hell's that?' If they say, 'I was evacuated
from this area, then you can see where that area is.

Other participants were more interested in the photo-sharing capabilities of the tool. "I imagine you're going to have a bunch of photos. Like hundreds and hundreds" (Participant 5). Indeed, many of the most successful Geoweb applications have centred on photographs for their ability to tell a larger story, the comparative ease with which this story can be told, and for the sheer number of photos people take and share. The photo-sharing element to the Fire History website was commonly seen as one of the main draws for active and passive users participating from home.

My initial observation of the participants using the tool was that they were fully engaged as passive users but less interested in becoming active users, something that is discussed more fully throughout this chapter. Initially, the map provides a rich, immersive experience that displays the information in a beautiful and straightforward way, opening lines of communication between participants and myself and prompting them to begin sharing their own stories. Considering its future as a museum exhibit, the map bodes well as a tool for opening lines of communication and attracting interest:

There isn't anything out there and this is, this might be a first for others. I
mean museums generally are pretty laid back…. When you do this and it's
a fire museum, it's pretty significant from a technical point of view people.
Most people, most organizations, don't even do that as far as interaction
(Participant 6).

The map provided something new and exciting that brought back memories for participants, however, the same technology that makes it so inviting proved a significant challenge for some participants.

Although participants expressed enthusiasm when using the map, commenting on its potential or who else they wanted to show it to, there were considerable differences in participants' ability to navigate the map. Most used the map to augment their oral storytelling and improve the accuracy of their memory, using the map to double check street names, dates, and the order of events or to demonstrate where things were happening. The map also functioned as a trigger, when switching to a new day

participants were reminded of other stories. This made for a large number of storytelling tangents during the interview (which also demonstrates the ongoing interest that exists about this fire). Participant 2, while exploring the map, still found issues navigating with the zoom function, trying to use the mouse wheel and becoming disoriented after zooming in too far. For the younger Participant 4, navigating the map proved 'second nature'. Surprisingly, Participant 6, an older man had similar comfort navigating the map, proving that these map navigation skills are not necessarily a factor of age. All other participants needed some of the basic map functionality explained to them and still had moments of discomfort understanding and using the tool. Participant 5 was the only user to experience technical difficulties using the website on his own computer. For him it was slow and clearly impacted his usage and enjoyment of the tool. Although he responded very well to the idea and enjoyed the map, it was slow to load and required considerable waiting.

Once participants had the opportunity to use the online tool for several minutes (and usually after hearing quite a few fascinating stories about the individual's experience with the fire) I would turn to questions about the online map and its potential use and application. Generally, I would ask participants if they would be more engaged if it were not a map but a discussion board, an offline lower-tech paper map, or someone asking them to tell their fire-related stories one-on-one. What I found was that while most were not as comfortable with the online map as they wanted to be, they appreciated having the map to help stimulate their memory and that although it would be nice to have the map on paper instead of online, it would not be as feasible or as accessible outside the museum.

Participant 6 expressed more interest in the online tool than any other option, "If you're doing it online it's done. It's instant… If I would participate, I would participate online…. We're all used to the Internet, well most of us are." Those like Participant 1 who were less comfortable with the computer still acknowledged "that that's the way everything is going now, is on the Internet and via computer and you put stuff up and it's so easy to manipulate and so easy to work your way around it if you know what you're doing." The last part of this quote, 'if you know what you're doing' seems to present the greatest challenge. In making the map more intuitive and allowing more people to be

comfortable with it, Participant 5 suggested ensuring above all that it is "user-friendly. That's ultimately what it's about. And simplify, simplify, simplify." Although he did not recommend simplifying to the point of dropping the mapping element "because people know they can orient themselves, they know where they live. I can't think of a better way.... It's interactive" (Participant 5). Participant 6 agreed with this saying, "The map is good because people, they can relate to where they are, especially if they lived down there." Participant 4 defended the map, suggesting that even the least geographically oriented stories still had a place on the map. She claimed that they would not benefit from a more discussion forum-type tool instead suggesting that:

> If it's just a general point, they can plunk it right here [indicates the approximate centre of the fire] because it happened about the mountain park fire. So I think they can just plunk it right in the fire, right where the fire happened if it's relevant.

This level of interest in the map was not surprising, given the highly spatial nature of the forest fire, the fact that for most participants this was their first time seeing any map related to the fire, and the clarity with which it was rendered on the map. What proved surprising was that the high level of computer skills required was not as much of a barrier as anticipated. With many participants, I found myself pushing them to be more critical.

During this discussion, Participant 3 expressed some concerns with the technology of the map among different populations. "A lot of older people aren't very computer literate so they might find it challenging. So maybe a paper map, something they can actually touch, feel and look at." Participant 5 agreed that a large paper map would encourage more participants in certain populations however, he suggested that "it's gonna get worn out.... This [the online map] is probably more important." Although less computer-literate populations might have trouble with the map, ultimately, placing it online opens up so many more avenues for participation and can actually enhance its relevance, longevity, and ultimately use. However, in considering audience, it is clear that the technology will remain a barrier:

> You'll probably have a lot of older, well, retired firemen too coming through here once this is all set up because this is their life. It's their life

for 30 years. So how many of them are computer literate? Not that many probably (Participant 3).

Participants 1, 2, 3 and 5 greatly benefited from my assistance in most aspects of operating the map, whether an initial lesson in what was there and how to use it, or just as a resource to turn to after accidentally zooming in too close. "I've had the advantage of you, I'm not that great at computers" (Participant 5). Additionally, participants seemed to feel that firefighters and other more 'blue collar' workers, who do not use computers in their daily workplace, would be particularly unfamiliar with the tool and require more aid. Thus, those most impacted by the fire may also be the least comfortable using the tool. As Participant 4 explains, the tool is "more for us [younger people] and the people who want to learn about it [the fire] whereas the people who were actually there might not" (Participant 4). This means that the tool is perhaps more beneficial for younger users who are likely to take a more passive approach to using the map, reading what is there, but lacking the experiences of the 2003 forest fire to be able to become active users and directly contribute to the map. Meanwhile, the older generation of firefighters and others who have the most experience to pass on are likely more interested in person-to-person storytelling, lacking the skills and inclination to learn how to use the mapping tool to add their own content. This online mapping idea is likely to exclude the main source of users with meaningful stories to tell.

However, participants felt that this issue of needing guidance to add to the online map was relatively simple to fix. Participant 1 found it interesting, suggesting that many would need "somebody here that can say 'okay now, this is how you book in, this is how you get in." With it being available not just online but also as a kiosk at the museum it is possible for potential participants to get assistance. Participant 4 made that exact argument:

> *If you have it set up like this there's obviously people, employees or volunteers, that will be sitting here that know the system so if there's [name omitted] and he's sitting there saying, 'I have no idea how to use this but I really want to add something', I'm sure there's somebody here that can [help].*

By having the map openly available online and physically present at the museum those who are less comfortable with the technology and want someone to assist them, can seek help from the museum volunteers. Those who are more comfortable with the map can use it from home. Indeed, those who learn to use the mapping tool at the museum can also take the knowledge home and participate additionally from there.

Even with this added assistance however, I question whether this form of online storytelling can meaningfully replace sitting down and physically talking to another person. I am uncertain as to the robustness of the online community, particularly as online familiarity and immersion decreases, as it generally does with age. Even with the map directly in front of them, participants were still turning to me to tell their stories and they were less interested in adding points to the map themselves. Perhaps if they had fewer opportunities to find a good listener, then they might be more interested in online communication. But I doubt whether the Geoweb can truly replace the natural nuances of a real-time face-to-face conversation. Ultimately, the person-to-person storytelling appears still more meaningful and the map can serve the more immediate purpose of capturing photos and other material that is simpler to share, since it doesn't require typing large amounts of text to get the same story across. The map is an effective way for outsiders to learn about the fire and to educate themselves and others about the issue of forest fires, but for those that were present during the Okanagan Mountain Park Fire, given their often limited interest in computers and higher ages the research found that they are more interested in person-to-person sharing.

All participants were interested in using the map passively, but getting them to move beyond and actively contributing to and participating in the map proved unexpectedly difficult. While participants were highly engaged in and enthusiastic about the map, taking the step to add a point proved challenging. Even when I removed the barrier of making an account by allowing participants to make posts on the museum account, it was still difficult. This difficulty seemed to stem from two issues. The first was that participants were telling their stories to me instead of to the map, demonstrating that person-to-person interaction is apparently more rewarding and easier. The second issue was that making a map point required them to have to type out their experiences, which when dealing with a more involved participant group can be extremely difficult.

Participants had less trouble finding a geographic location to place their point but found narrowing the content into a readable experience to be problematic.

Participants used the map as cues to storytelling but needed considerable nudging from me to add a point. Even after I directly suggested making a point about a topic with Participant 1 she almost immediately went off on a tangent. As she stated, "the problem is that you start talking about one thing and then you get onto something else, then that reminds you of something else." Other participants were less comfortable with typing large amounts of text, wanting me to type while they dictated, or having considerable difficulty deciding what information to add. Participant 3 had in mind a coherent story to add to the map as a marker but remained uncertain about how to add it and required guidance. Both Participants 5 and 6 claimed disinterest in adding a point because of difficulties whittling their vast experiences with the fire to a single point on the map. Participant 5 voiced potential concerns over online privacy related to creating an account, "I can't stand spam so I am reluctant to give too much information about myself online." Despite his reluctance, Participant 5 did create an account and did decide on something he was prepared to write.

Ultimately, those who did manage to create map points invested substantial effort and time into their points, carefully considering the points they added, debating the exact wording, and taking quite a while to craft their contributions. Participants 3 and 4 discussed extensively the location, content, and timing of the point to ensure factual accuracy and that their points would be valuable and interesting. Participants provided candid descriptions about their feelings and memories of the fire, proving that those who have experienced a disaster event like this are indeed experts because of their lived experience.

While participants agreed that the online map was an effective approach to gather and disseminate information and experiences about the Okanagan Mountain Park Fire, there are clearly still issues with technological literacy and willingness to utilize online tools. Although all the participants were excited to be passive users of this interactive, visually dramatic tool, when it came time to become active contributors enthusiasm waned. Alarmingly, this is likely worse among some of the most affected people; those who are less used to computers in their day-to-day lives and are older. Although the map

tool was well received, by using these unfamiliar online technologies, it is possible that the project excludes the main intended participants. Participants all agreed that the map portion of the tool was ideal, interesting and able to promote dialogue and as such is a valuable tool online and at the museum. Where they expressed doubts was in the potential of the technology to alienate participants, mainly those who may have the most to share.

5.2 Other factors of participation

As discussed previously the research revealed that, the online Fire History map is best suited for a younger, more technologically literate audience, however, participants still suggested that there could be benefits to gain for older participants especially in the map's ability to post photos and to augment or trigger memories. Through the interviews conducted during the course of this research however, I determined other factors that influenced participation, including continued interest in the fire, level of experience during the fire, and the broader issue of how the tool is marketed.

Levels of engagement and interest using the online tool appear contingent on the interest level of potential participants in the actual fire. Those who were barely impacted by the fire and felt less at-risk or burdened because of it are likely to be less interested in adding their experiences, although they might want to read others' contributions to learn more. For those who experienced the fire more directly, adding and interacting with the map can be overwhelming and make them feel unsure where or how to start sharing their experiences. For some, there are just too many stories to tell and they would rather not contribute and so avoid having to sift through a vast number of often painful experiences and choose one or two to share.

Of the six participants, four of them were heavily involved in the fire in a variety of ways. Some considered themselves "a different case" (Participant 5) because they had already contributed written pieces about the fire or were so impacted that summarizing their experiences into a few points on a map proved difficult. Participant 6 had a large store of photos from the fire, but claimed that deciding which to add to the map would take a long time; "if you have too much information then you feel like you're overwhelmed" (Participant 6). Adding only a few points can also be conceived as being reductionist. By condensing their entire experience with the fire into a point on the map I

may be asking users to de-value their experience and memories. Despite this, Participant 3 suggests that, "There's always things that stick out in everyone's mind." Maybe this is the key to allowing someone who was so involved in the fire to choose only a few of his or her most profound stories to add to the map.

Furthermore, there are some who were highly impacted by the fire but are not interested or willing to talk about the experience due to the levels of stress and trauma that still persist. Some firefighters and homeowners have moved on and are not interested in revisiting their experiences. "There are some who lost their houses who may never want to talk about it because it was so upsetting" (Participant 5). Potential contributors can be sensitive in other ways too, and are acutely conscious of being seen as splashing their name and experiences everywhere. Some are also less engaged in verbal storytelling and Participant 1 suggests that these textual contributors can rely on the website at the museum or their own home as a place to provide "their own little bit and pieces" privately. The map's potential to maintain anonymity might increase the likelihood for some of the more humble potential users; "he can't stand it when someone calls him a hero" (Participant 3). Some who might feel it's bragging to post about their experiences and accomplishments during the fire "might like it better. He can get his point out but people don't, he doesn't have to have his name plastered all over the place" (Participant 4).

Aside from these differences in immersion and interest in the fire as well as personal differences in sharing preferences (oral or written, online or offline storytelling), there are also clear cycles of interest that continue, even almost a decade after the fire. Participant 5 explained these ebbs and flows of interest in sharing. While initially after the fire "everybody wanted to tell their stories and it was like counseling a support group to talk about the trauma", after a few weeks nobody wanted to tell their stories anymore. This trend was seconded by Participant 6: "At one point I probably got too much of the fire. I was so inundated that after 6 weeks I was literally drained and I just sort of wanted to go away because it was too much." Interest resurged for the first anniversary of the fire, "so I would think, we're coming up to the tenth anniversary in a year and people are gonna want to talk about it then. They'll never tire of telling, of talking about it" (Participant 5).

This storytelling aspect is an unexpected key factor in understanding influences on a user to participate. There is an assumption that we can make participation easy and simplify it for participants. However, the fact remains that participants see contributing to an online tool as something with more permanence than oral storytelling and this effort requires careful deliberation and planning. Leaving a written record asks participants to have a higher level of confidence in information accuracy and a more effective way to communicate. For Participant 5, this translated into a reluctance to participate. As he stated, "there's nothing I can really add because my memory was way more vivid then than it is now about that time." While oral storytelling was straightforward and simple, with all participants sharing profound, interesting, exciting, and even hilarious stories, they remained reluctant to type them into a map marker. Through these interviews I learned about the health impacts of the fire, the evacuation, the personal stories, as well as the highs and lows and it only reinforced this notion of multiple truths. These six participants all saw the fire completely differently, remember it differently, and reflect on it differently and I suspect I could have interviewed 50 more and those differences would have remained. As Participant 4 noted, "It affects everyone differently" (Participant 4). The map served a purpose as a trigger for stories, leading our discussions down many fascinating tangents, yet it failed to encourage participants to want to share their stories online. This was not due to a failure of the map to pique their interest. Indeed, for some participants the map pulled them away from the conversation, "sorry, I didn't answer your question, I'm still lingering on the map, can you re-ask your question please?" (Participant 5). But it is clear that to transform from a passive internet user to an active participant is a substantial challenge for users.

One interesting aspect of this research that can perhaps explain some of this reluctance to tell stories online was the frequency with which participants told other peoples' stories.

> *He said you have to be there to actually experience it, you can't even say what it feels like or describe it but we heard quite a few different stories from him, from his being out there and frightening for them all, I'm sure* (Participant 3).

I should have anticipated this because we are storytellers; we enjoy sharing stories and often repeat the ones we hear. Participants in every case got caught up telling other people's stories; "you got to know some of them, you got to know some of their stories" (Participant 1). However, while we are all comfortable sharing the stories we hear orally, participants would not post these secondhand stories onto the map. Both Participants 1 and 2 were great storytellers sharing stories that were bound temporally and geographically and could have resulted in a dozen points. However, they were not interested in adding these stories to the map and likely did not feel that they had the right to post someone else's experiences.

As easily as they told others' stories, participants often struggled with their own, finding it difficult to sum up their own experiences into one point as they could with others'. Personal stories are more complex and less easily summarized to one location and a shorter word count. Individuals have too much information about themselves to manage this task. So, while we can tell other peoples' stories with ease and they have become more polished with constant retelling, we would likely all have more difficulty summarizing our own. We also would likely feel hesitant to make points out of the experiences of others out of respect for the other person's right to tell their own story.

Only two participants managed to sum up their entire experience into a single point, however they were the two with the narrowest range of experience and responsibilities. They spent the fire in one location, doing one job and although incredibly busy and overworked for that period they could summarize their experiences.

Another area that can greatly impact users' willingness to participate lies in the influence of marketing; making people aware that the map exists and making it seem interesting or exciting enough to engage potential participants is vitally important in encouraging participation. Getting more contributors and creating a 'buzz' was something all participants identified as being able to increase the content, and likewise, increase interest. In our conversations, we spoke about interest flaring up suddenly once a certain level of awareness is reached; "once you get it going it goes fast" (Participant 3). Through social media and increased interpersonal connections, "it's scary how fast something can go all over the place because people share it" (Participant 4). Participants suggested being ready for this wave of interest when it occurs and to take advantage of it.

Participant 6 spoke at length of having the mapping tool fully prepared for the users to ensure a positive first experience. From most people who visit the website we will have one chance to convince them that the tool is interesting and dynamic enough to make it worth participating and worth coming back to. As Participant 6 states:

> *Sometimes you have to have things ready and then when they're ready and they're interested or they find an article or they find their image that they've had under wraps and somebody reminds them, then they'll go… If the tools are there, everything is there and I'm ready to use it and it's there that's better than the other way.*

Interviewees also identified that by having the map permanently in the museum, visitors will see it and word will get out. In addition, we should be making a concerted effort to promote the map in the mainstream media, to get as much publicity as possible to jump-start that surge of interest. This interest also needs to be maintained, "Sometimes you'll look at a website and the last posting that's been on there has been 5 years ago. Well then you know where that's going" (Participant 6). During interviews participants had many suggestions on media strategies and other ways to make the website successful. Despite their reluctance to participate, they seemed to feel the project had merit. It seemed paradoxical that participants were so interested in the tool and saw so much potential in it, yet remained largely uninterested in contributing to it themselves.

5.3   Participants as experts

During the interviews participants provided candid descriptions of their feelings and memories of the fire and when translating these experiences to text on the online tool, they tended to invest substantial care into how they presented their data. This experience demonstrated the power of participants as experts of their own experience, fully capable of expressing themselves and helping others understand their experiences. What proved less straightforward was convincing participants of their own expert status.

Volunteered geographic information (section 2.4) and hyperlocal media (section 2.3) literature stress the importance of ordinary citizens as experts. Both areas see the general public as a hugely valuable, yet largely untapped resource, willing and capable of reporting their own experiences intelligently. What I found was that while participants enjoyed using the map and liked to tell stories this did not translate into more points

being placed on the map. As previously discussed, this is partially because of a preference for person-to-person storytelling, where feedback is immediate and listeners are clearly visible. It is also because of the difficulty with which participants could craft points that were clearly articulated and avoided feeling too diluted. However, it is also because of difficulties identifying the self as an expert. Issues with this expert distinction cropped up during recruitment for interviews, and continued through to when it came time to add points to the map.

Each participant was highly engaged in the conversation and proved to be an adept storyteller. However, the majority of their stories were about other people, with bits of their own story intertwined as reference points. For example, when speaking about an evacuee's experience, Participant 1 alluded to her own experience as well. Only Participants 3 and 4 were able to coherently tell their own story, for others it came in bits and pieces, intertwined with the stories of others. In evaluating why it is that people appear more comfortable telling other people's stories than their own I considered the vast complexity of their own stories compared to the relative simplicity and sense of removal from someone else's. Their own stories are messy and complicated because they know the whole story and are unable to sum it up quickly and easily without leaving out substantial portions. By telling someone else's, it is already summed up nicely for him or her. Their own stories were a complex narrative and would have been difficult to create one or even several map points. Participant 6 expressed the difficulty he would have sorting through and selecting a few photos to post and explained that he had far too many to ever post them all. Asking participants to provide one or two points to sum up their experiences is asking the impossible. Those points that were created were highly reductionist and in the long run could devalue some participants' experience. Longer entries allow more scope but take longer to create. Participants spent considerable time on their entries, short as they were, and I find it hard to imagine many people wanting to write about their experiences enough not to feel shortchanged. For interview participants, a core value lay in oral storytelling rather than sharing through the online medium.

When recruiting participants, I found it difficult to convince potential participants that they knew enough and were sufficiently authoritative about the event to speak about their experiences, to write about them, and to ultimately share these with the broader

public. Most seemed to feel that I should want to speak only to those most impacted by the fire instead of the cross-section of Kelowna participants I was hoping for at the outset of the research. However, even these more impacted participants (who had been identified by others through snowballing as potential key informants) were not quick to consider themselves experts and although speaking with some authority, were reluctant to leave a written record of their stories, instead suggesting others who might know more about other aspects of the fire.

Using snowball sampling, my original plan was to wait until the end of the interview to ask if they could refer me to anyone else that I should interview. What occurred was that the referrals poured in before I even had the chance to ask. All participants were quick to identify other 'experts' on the fire. Participant 2 recommended and wanted to provide contact information for two others, while Participant 1 volunteered the Emergency Social Services volunteers: "they can come down, click on this and add some of their own comments from their perspective. I mean it's fine for us to have all this information and all these stories but other people may see things a little differently." Participant 3 consistently referred her husband, "I should tell him to come down here and put his two cents on here", as well as several others. Although she did not self-identify as any sort of expert holding any special knowledge, Participant 3 clearly considered her husband to be the real expert. Participant 5 suggested plenty of other informants as well, telling me, "Oh, he should have time. Of course. He'd love to" and referring to no less than five others. These referrals acknowledged the status that participants placed on others and their stories and sometimes demonstrated the lack of importance they placed on their own experiences. Even though they enjoyed telling me their stories, when it came time to add stories to the map, they suggested others' stories as being more important.

This eagerness to tell others' stories might have translated to participants adding others' stories to the map instead of their own; however, because of the permanence and official-looking nature of the webpage, participants might have been intimidated to do this. While they were comfortable and eager to tell their others' experiences, and to a limited extent their own, they failed to share this online. The stories that people were

most comfortable with were others', which in turn they would feel they did not have the right to add to the map.

The biggest barrier to participation was this classification of 'everyone as experts'. No matter what the academic literature may say, ordinary people are reticent to consider themselves as experts, even of their own lives and experience. Although everyone can participate, not everyone considers themselves to be sufficiently authoritative. The challenge remains to find a way to convince the broader public who experienced the fire in less profound ways that their stories do indeed count and they too may add their experience with fire, or to find better ways for the most impacted to contribute without devaluing their experience nor having to type pages of text.

6.   Conclusions

This research set out to determine influences on individual willingness to volunteer geographic information related to the Okanagan Mountain Park Fire. Results clearly demonstrated specific issues relevant only to this case study, as well as broader findings that are useful to other projects attempting to engage members of the public in similar ways when dealing with the aftereffects of natural hazards.

In assessing whether my research question had been adequately explored I first considered where the project had shown success, both in answering my question as well as meeting the Kelowna Fire Museum's goals. When determining the success of the research aspect, I first considered the study itself, employing techniques like member checking, prolonged engagement, self-analysis, and congruency checks to ensure validity. Although locally based and not intended to be easily transferable, there are still broader themes that apply at a disciplinary scale and to other similar projects. When examining the success of the mapping tool, it was difficult to turn away from more traditional evaluation methods. Unlike other online tools, looking at the number of page views or points added would not have been indicative of success except in marketing, which was not a focus of this study. When examining success, I considered it in terms of the quality of the experience of the mapping tool according to participants: most importantly how well it overcame barriers to participation, but also what issues or problems still exist and whether it would work in the context of the museum.

Like the pilot study, this research showed at the effectiveness of visually displaying forest fire information in a dynamic, exciting, and interesting way that promoted a better understanding of the fire. Participants' feedback on the design, style, and function of the online mapping tool was positive. Participants found the map an ideal way to quickly and easily demonstrate the size, speed, and location of the fire and praised its quality as an educational tool, even for those who had experienced it all. They felt that less technology-reliant aspects like a discussion forum or an offline map, although easier to use, could not outweigh the advantages of the online tool, nor could they capture the imagination or interest in the same way, and thus would limit the potential participant base.

What proved less successful was getting participants to add their own experiences and stories to the map. Although participants appreciated what the map was trying to achieve and understood the idea of 'everyone as experts', ultimately they either failed to recognize their own authority to report on their experiences, or they had difficulty condensing their range of experiences into just a few points on a map. All the participants interviewed were effective storytellers, engaged in sharing their experiences and just as often, repeating the stories and experiences of others. However, this appeared as the root cause of the difficulty in participating. Having an interested listener, it was much easier for participants to speak their stories instead of typing them out. Also, because a point on this official-looking map represents a more permanent record, participants were cautious about wanting to keep their facts straight and honestly express what happened through their own experiences. While this is advantageous in terms of creating a useful historical tool, this extra care meant that adding points became more onerous, and the end result still represented only a fraction of their experience. The other factor to this type of permanent written record is that participants were reluctant to type out others' stories, feeling that they did not have the right to add those experiences.

Participants were also challenged by the technological aspect of the online map itself and expressed doubt that many of the potential participants (who are older and usually 'blue collar'), would be comfortable participating. While in this case the issue could be mitigated partially by setting up a kiosk in the museum where volunteers are present to assist, it does little to address continued concerns of computer literacy among participants. This issue is more broadly applicable for any online participatory mapping projects, and can be partially mitigated through increased planning for less computer-minded individuals but must be further considered in other research.

Another key area of discussion centred on the definition of 'expert'. While the volunteered geographic information and hyperlocal media literature stress the importance of 'everyday experts', we found that participants were uncomfortable being considered as experts and presented as authoritative voices, even in relaying their own stories. Most who were affected by the fire felt that their stories were of less importance and suggested letting the 'real experts' add their experiences instead. In other words, those who worked or volunteered throughout the entire fire in a more professional capacity and may have

had a broader range of experiences. However, these 'experts', even after being identified by several others as experts, were also uncomfortable being considered authoritative on the subject and had difficulty summarizing their own experiences which cover multiple stories often in multiple locations, in a set of readable and interesting points on the map. Going into the research we did not expect for such humble participants, expecting participants to be proud and prepared to share their experiences. Instead we found participants reluctant to brag and quick to praise others, and willing to tell their stories to me, but not online. This reluctance to self-identify as an expert is also potentially important to similar research projects and should be studied in more detail and in different contexts.

The participatory community-based research presented in this thesis embraced multiple knowledges, bringing forward a range of people into the research process and allowing a multiplicity of voices. It involved extensive interaction with participants and our partner organization, which allowed us all to challenge assumptions and question research findings. In the interviews, valuable conclusions were reached concerning the fire, the online mapping tool, and the motivations of participants. This research sheds new light on issues of participation of using the Geoweb. While the map was well received and experiences related to the Okanagan Mountain Park Fire was clearly considered to be as relevant today as ever, the broader problems of enabling more meaningful and effective storytelling online and this issue of not being 'expert enough' continue to nag.

These findings are being applied to the project as it enters its next phase. The Kelowna Fire Museum and Education Centre will install the map as a permanent exhibit and will attempt to facilitate more widespread participation. The tool will be promoted using the participants' suggestions, attempting to convince members of the public that every story matters and to actively participate and contribute map points. This project identified the importance of the fire to the area and the interest that still exists surrounding it; we still believe that this can be capitalized to create a patchwork of collective knowledge and experience with forest fires that. The volunteered information amassed on this resource could influence people's perception of fire hazards and risk and also promote interest not only emergency preparedness, but also in fire prevention. To

further encourage participation, the museum will be attempt to regularly change themes, and participants will be asked to create points on a specific topic or aspect of the fire. Questioning members of the public to tell us, for example, about 'hope', can make it easier for participants to turn their experience into a point on a map. While asking people to 'tell us about the fire' may be overwhelming, breaking it up into these more manageable and changing themes might enable more effective participation. This strategy will be explored when the map goes online. Meanwhile, the tool and the technology stand in readiness and in the case of another interface forest fire could serve as a hyperlocal reporting tool as well, as Glaser (2007) has attempted with California forest fires.

The Okanagan Mountain Park Fire changed the city of Kelowna in many ways. For the 238 families who lost their homes it was a painful time of loss and rebuilding. Others returned to homes so damaged that they were unlivable for weeks. Even for the evacuees whose homes did not burn, their neighbourhoods have changed permanently. The threat of fire has been made starkly visible for the entire valley, and in the months after the fire, residents were still questioning what could have been done differently and how to be more prepared in the future. After this fire, changes were made in the fire department, provincial forest service, building regulations, and Emergency Social Services to better meet disaster when it occurs again. However, not all impacts were negative. This fire marked an outpouring of appreciation as the whole community pulled together in unexpected and amazing ways, volunteering thousands of hours, donating goods and services, and raising funds to return what was lost. This project attempts, through participatory mapping, to ensure that all of these fire impacts are remembered, a goal that the Kelowna Fire Museum and Education Centre shares.

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Appendices

Appendix A: Pilot survey

1. Please indicate your gender

○ Male

○ Female

2. Please indicate your age

○ 0-18

○ 19-34

○ 35-64

○ 65+

3. Please indicate your occupation

4. Please list 3 words that best identify your first impression of geolive.ca/firehistory

1

2

3

5. Please rate each of the following components of the website? (from 1 for excellent to 5 for poor)

	1	2	3	4	5
Navigation	○	○	○	○	○
Organization	○	○	○	○	○
Fonts	○	○	○	○	○
Map overall	○	○	○	○	○
Colour scheme	○	○	○	○	○
Website overall	○	○	○	○	○

6. Please rate each of these functions from 1 being excellent to 5 being poor. (0 indicates you have not tried this function)

	1	2	3	4	5	0
Map	○	○	○	○	○	○
How to	○	○	○	○	○	○
Forum	○	○	○	○	○	○
Links	○	○	○	○	○	○
About	○	○	○	○	○	○
Login - registration function	○	○	○	○	○	○

Additional comments

7. Within the mapping tool, please rate the ease of use of the following components with 1 being excellent and 5 being poor. (0 indicates you have not tried this function)

	1	2	3	4	5	0
Map navigation tools and zoom	○	○	○	○	○	○
Full screen function	○	○	○	○	○	○
Temporal slider bar	○	○	○	○	○	○
Layers tab	○	○	○	○	○	○
Creating discussion points	○	○	○	○	○	○
Creating points of interest	○	○	○	○	○	○
Photo/link uploader	○	○	○	○	○	○
Viewing embedded objects, text and media	○	○	○	○	○	○

Additional comments

8. Did all of the functions of the website work for you?

☐ yes   ☐ no

If no, which functions did not work? Do you know why?

9. Would you visit this website again in the future?

○ Yes

○ No

Why or why not?

10. Please identify which features would likely keep you coming back to the geolive.ca/firehistory

11. Do you have any additional comments to share or points to raise?

Appendix B: Recruitment letter

Forest Fire Mapping Project—Recruitment Letter

About the Project

This study is being conducted through the University of British Columbia Okanagan in partnership with the Kelowna Fire Museum as part of a Master's research thesis by Samantha Brennan and with Dr. Jon Corbett. The goal of the project is to bring together community members in the Okanagan region (particularly Kelowna) who have been impacted by forest fires to collectively map these impacts and develop an Internet–based map that will be made publicly available.

Through this project we hope to better understand how digital mapping applications can engage the public on forest fires and allow us to better understand this issue. The mapping component of the project will take place approximately until Spring 2012. We hope to launch the map as part of the Kelowna Fire Museum.

Invitation to Participate
We are looking for volunteers within the region to participate in the project and help us in generating an informative historical forest fire map. We are requesting submissions for the map in the form of photos, video or text on how people are impacted by forest fires. All submitted information would be made publicly available over the Internet. We are hoping to arrange a number of workshops to test the website followed by focus groups or semi-structured interviews to gather opinions on the usefulness and usability of the website.

All participation is strictly voluntary. The time requirement is flexible to suit your needs. We do not foresee any direct benefits or potential harm to you as a result of participating in this research. Participants should be aware however, that personal feelings and events surrounding forest fires are the focal point of this study. If this makes you uncomfortable, you are advised not to participate.

If you are interested in participating please contact **Samantha Brennan at (250)-470-2118 or by email at forest.fire.history@gmail.com**. Any concerns about the project may be directed to the research supervisor Dr. Jon Corbett at (250)-807-9348, or email at jon.corbett@ubc.ca.

Appendix C: Statement of informed consent

[_____ ____, 2012]

Forest Fire Mapping Project—Statement of Informed Consent

This study is being conducted through the University of British Columbia Okanagan by Dr. Jon Corbett and Masters student Samantha Brennan. You are being asked to participate in this workshop and focus group or interview because of your involvement, interest in and experience with forest fires in the Okanagan. We are grateful that you have agreed to participate. The workshop and focus group should take no longer than two hours to complete and your responses during the discussion will be audio recorded by the research facilitator. You are free to withdraw from the group at any time, with no consequences.

The goal of the project is to bring together community members to collectively map forest fire experiences in the Okanagan using a digital mapping tool to document the human impacts that forest fires have. Through this project we hope to better understand how these technologies facilitate participation in the mapping process and how they can be used to engage the public on the issue of forest fires. We do not foresee any direct benefits or potential harm to you as a result of participating in this research. Participants should be aware however, that personal feelings and events surrounding forest fires are the focal point of this study. If this makes you uncomfortable, you are advised not to participate.

We are committed to respecting your privacy. We encourage all participants to refrain from disclosing the contents of the discussion outside of the focus group; however, we cannot control what other participants do with the information discussed. The data we collect during this interview will be securely stored at UBC Okanagan. Any information released for external use will be purged of anything that might identify you, such as names, addresses, telephone numbers, etc. No individualized or named data derived from the semi structured interviews or focus group discussions will be made available to an external audience. The primary intent for the data will be to inform Samantha Brennan's Masters student thesis. If in the future we would like to follow up on some of the information you have given us, you will be contacted first to request your further participation. No other use will be made of the contact information that we have collected. For questions related to this research, please contact Dr. Jon Corbett at 250-807-9348, or email at jon.corbett@ubc.ca. If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 1-877-822-8598 or the UBC Okanagan Research Services Office at 250-807-8832.

By signing this form, you are indicating that you have read and understand the points outlined above, and consent to having the information you provide used for research purposes. Note that you are signing two copies, one of which is for you to keep.

I have received a copy of this consent form. ☐

_____   _____

Signature of Participant   Date

_____   _____

Signature of Investigator   Date

Appendix D: Data release form

[_____ ___, 2012]

Individual Participation and Consent For Mapping Content

About the project:

The *Forest Fire Mapping Project* is a collaborative project involving the members of the Kelowna Fire Museum, and Dr. Jon Corbett and Masters student Samantha Brennan from the University of British Columbia Okanagan. The project is being conducted through the University of British Columbia Okanagan, and supported by the Kelowna Fire Museum. The goal of the project is to bring together community members to collectively map forest fire experiences in the Okanagan using a digital mapping tool to document the human impacts that forest fires have. Through this project we hope to better understand how these technologies facilitate participation in the mapping process and how they can be used to engage the public on the issue of forest fires. Any and all participation in the project is purely voluntary, and participants are free to withdraw from the project at any time.

How will the project work?

We will be setting out to collect information, in the form of photos, text and video material, on personal impacts of forest fires in the Okanagan. The information will be represented in an online digital mapping format that will be made freely available to the public through a website.

What if I have any questions?

If you have any questions or concerns you can ask the Principal Investigator for the project, Jon Corbett (250-807-9348 or jon.corbett@ubc.ca). The project is being conducted through the University of British Columbia. If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 1-877-822-8598 or the UBC Okanagan Research Services Office at 250-807-8832.

Participation and Use of Materials:

We would like you to participate in this research project. It is important that you understand a few things first. **Your participation in this research is purely voluntary**.

If you don't want to participate then please don't. If you do decide to participate, and then decide later that you don't want to anymore, you are free to withdraw. **You can withdraw at anytime**. If you do decide to withdraw, your contributions to the research including picture, videos and text will be returned to you if you wish.

If you decide to let us use your contributions, we will combine the material with contributions from other people to create a map about human effects of forest fires in the Okanagan. This information will be shared with the public and may be used selectively by the university research team to understand our research questions. If you do not want us to use your materials we will return the originals to you and not use them in any way. If you want we will give you copies of everything (both the original materials and the final products).

It is important to understand that if you allow your materials to be used as part of this project your contributions will not be confidential. The video/photographs may show your face so others will be able to identify you. The information won't be anonymous anymore, so it is very important that you are comfortable with what's on the content that you are submitting.

We will give you access to digital copies of the map and send you copies of any report, books, maps or other writings we produce at the end of the project.

So, the question is, will you let us use the information you just gave us for the project? Please tell us by filling out the form below.

I, _____ agree to allow the *Forest Fire Mapping Project* to use my workshop materials in the creation of reports, publications, and maps about the Forest Fire Mapping Project. I understand that I will get copies of the material and can use them as I like, but I am giving the project the right to use the materials.

_____   _____

Signature of Participant   Date

_____   _____

Signature of Witness   Date

Appendix E: Interview guideline

Interview / Focus Group Script

You have been invited to participate in this interview/focus group session based on your involvement in *Forest Fire Mapping Project*. The interview/discussion will take no more than 60 minutes. During the interview/discussion I will be audio recording to allow me to concentrate on what you are saying, if you are uncomfortable at any time please let me know and we can stop the interview/discussion.

I have a some questions to guide us, please answer to the best of you ability and if you have anything additional to add, please let me know. Thank you again for agreeing to participate.

About the Project

The *Forest Fire Mapping Project* is a collaborative project involving the members of the Kelowna Fire Museum and Education Centre, the public and faculty and students from the University of British Columbia Okanagan. The project is being conducted through the University of British Columbia Okanagan, and supported by the Kelowna Fire Museum and Education Centre. The goal of the project is to bring together community members to collectively map forest fire experiences in the Okanagan using a digital mapping tool that can be used to document the human impacts that forest fires have. Through this project we hope to better understand how these technologies facilitate participation in the mapping process and how they can be used to engage the public on the issue of forest fires. Any and all participation in the project is purely voluntary, and you are free to withdraw from the project and/or this discussion at any time. It is important to note that because this activity is being conducted in a group setting there are no guarantees of an individual's confidentiality.

Guideline Interview Questions:

1) In what ways have you been affected by forest fires?

2) Did you feel comfortable submitting information using the map? Why or why not?

3) What worked for you with regards to this tool? (i.e.: What are its strengths?)

4) What did not work for you? (i.e.: What are its limitations?)

5) How can these mapping applications influence the public and firefighter's understanding of these and other fire issues?

6) If the technology were different (for example, paper mapping) would this have changed your level of participation?

7) Would you use this tool again? If so, what for? If not, why not?

8) Do you feel forest fires are a continuing risk in the Okanagan? How might tool be used to address this?

Thank you again for participating in this project and informative interview/focus group session. I will have available a digital copy of my thesis to all participants on completion and a summary option of my findings. If you have any further questions or feedback don't hesitate to contact me.