"We have the best life there ever was": Linking sense of place and adaptive capacity in Nova Scotia's coastal communities.

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

As humans we have an innate connection to the geographic places and social communities we inhabit. How then do these connections, which form our sense of place, influence our ability as individuals and communities to adapt to changing social, economic and environmental conditions? Climate change adaptation literature focuses primarily on material attributes of adaptive capacity such as access to resources, technology and infrastructure, while socio-economic attributes such as culture, values and identity receive less recognition. Specifically, there has been limited research on the interaction between sense of place and adaptive capacity. I approach this research with an inductive, qualitative case study methodology involving coastal communities along the coast of Queen and Shelburne Counties in Nova Scotia. Methods include participant observation and 36 in-depth semi-structured interviews with fishers, fish buyers, and federal Department of Fisheries and Oceans employees. In addition to interviews I used photovoice as a method to engage youth in this discussion and obtain a multi-generational perspective. I highlight examples of sense of place within the case study site and analyze how these may aid or hinder the adaptive capacity of communities and individuals through the categories of flexibility, assets, social organization, and learning. Outcomes of this research suggest a variety of specific ways person-place bonds influence adaptive capacity, highlight social connections as the most commonly cited link between sense of place and adaptive capacity, and recognize that coastal communities display important aspects of socio-economic adaptive capacity despite often low levels of material adaptive capacity. These outcomes lead to a set of three recommendations for municipalities and provincial departments looking to improve adaptive capacity among some of the most vulnerable regions of Nova Scotia.

Keywords: Climate change, adaptive capacity, sense of place, fisheries, Nova Scotia, Atlantic Canada

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Dedication

To the Maritimers working in Alberta who would rather be at home fishing.

Disclaimer

Throughout this thesis I consistently use the term 'fisher' to describe people who participate in the fishing industry. While 'fisherman' is the colloquial term and the one used by all of my participants to describe themselves, I have opted to use gender neutral language. Occupational terms such as 'fireman' and 'policeman' have become replaced by 'firefighter' and 'police officer'. However, there remains no commonly accepted replacement for 'fisherman' in everyday language. Most academic literature refers to fishermen as 'fishers'. I do not find this a particularly satisfactory term as it can also be used in reference to a bird or a small furry animal and is not generally accepted by fishermen (or women) as a word they would use to describe themselves. However, until such point as a better alternative arises I will use fisher so as not to subtly exclude women from this title.

Quotations at the beginning of each chapter have received verbal consent from each participant for inclusion of their name with the specific quotation. See Appendix G for the verbal consent script used to receive permission for inclusion of these participants' names.

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List of Abbreviations and Acronyms

DFO   Department of Fisheries and Oceans

DFO-SCH   Department of Fisheries and Oceans Small Craft Harbours branch

EAC   Ecology Action Centre

EEZ   Economic Exclusion Zone

EI   Employment Insurance

ICSP   Integrated Community Sustainability Plan

LFA   Lobster Fishing Area

MCCAP   Municipal Climate Change Action Plan

NS   Nova Scotia

Chapter 1: Introduction

Farewell to Nova Scotia,

The sea-bound coast,

Let your mountains dark and dreary be.

For when I am far away,

On your briny ocean tossed,

Will you ever heave a sigh or a wish for me?

~Farewell to Nova Scotia

Traditional folk song, artist unknown

1.1   Problem Context

Coastal communities are increasingly vulnerable to the impacts of climate change (International Panel on Climate Change (IPCC), 2014). Within Atlantic Canada—which includes the provinces of Nova Scotia, Prince Edward Island, New Brunswick, and Newfoundland—there is now evidence of climate change such as temperature and precipitation increases, sea level rise, more frequent and intense storms, higher storm surges, and loss of sea ice (Vasseur and Catto 2008). Climate change adaptation refers to "actions undertaken to reduce the effects of climate stresses on human and natural systems" (McClanahan & Cinner, 2012, p. 4). Adaptation strategies in Atlantic coastal communities include relocating vulnerable coastal structures, accommodating anticipated conditions by building structures higher or on stilts, and protecting shorelines with rock or vegetation reinforcement (Vasseur and Catto 2008). However, social science research indicates the importance of looking beyond physical adaptation to the socio-economic conditions that impact the ability of individuals and communities to cope with and adapt to change—known as adaptive capacity (O'Brien & Wolf 2010; Fresque-Baxter & Armitage 2012; McClanahan & Cinner 2012; Adger et al. 2013). Adaptive capacity is defined as "the conditions that enable people to (1) anticipate and respond to change, (2) minimize and recover from the consequences of change, and (3) take advantage of new opportunities" (McClanahan & Cinner 2012, p. 72).

This thesis refers to sense of place experienced by both individuals and communities. Use of the term 'individual' means a single person or household. The term 'community' can refer to

people belonging to a group defined by geographic boundaries, or to a group of people defined by similar interests, values or culture (Pretty et al. 2003). My research refers to communities by the former definition- a group of people defined by the geographic and municipal boundaries within which they reside. Investigating how individuals and communities understand and adapt to problems such as climate change requires consideration of the complex interactions between social and ecological systems. Communities rarely deal with climate change issues in isolation from often more immediate global and socio-economic concerns they face (Smit & Wandel 2006; Charles 2012; Moerlein & Carothers 2012). Exposure to the effects of globalization such as mass consumerism, global trade and cheap air travel put additional stress on social and ecological systems (Leichenko & O'Brien 2008; Vasseur & Catto 2008). In addition to climate change and globalization pressures, Atlantic coastal communities face numerous socio-economic challenges including decreased access to fisheries, outmigration, aging population, and comparatively high rates of unemployment (Hamilton & Butler 2001). Currently, research on social-ecological attributes of adaptive capacity that considers multiple drivers of change is sparse. Therefore, this thesis aims to fill this research gap by considering the broader socio-economic conditions that affect the adaptive capacity of communities to all sorts of change.

This thesis centres on adaptive capacity in the context of the fishing industry in coastal communities dotting Nova Scotia's South Shore from Port Clyde in the West to Port Medway in the East (as seen in Figure 3.1). Declining fish populations and shifting labour trends present two major vulnerabilities facing coastal communities. First, 63% of fisheries around the world are declining and require rebuilding (Worm 2009). Thus, socio-economic and ecological challenges put additional strain on fisheries already in decline due to overfishing and mismanagement (Perry et al. 2010). Therefore, it is important to consider specifically how fisheries are vulnerable to the impacts of climate change, along with the social and ecological factors that affect the ability of fishers and coastal communities to adapt to these changes. Importantly, how individuals perceive change and respond to environmental stressors can indicate barriers and enablers to their adaptive capacity (Sievanen 2014). Scientists generally agree that climate change negatively impacts fisheries by increasing risk and unpredictability (Perry et al. 2011; Holmyard 2014; Sievanen 2014). Climate change also affects coastal communities through flooding, property damage and erosion due to sea level rise and storm surge. It is no coincidence that Milfont et al. (2014) found that those who live closer to the coast are more concerned about

climate change than those who live inland due to higher levels of exposure and prolonged observation of change.

Labour force transformation over the past several decades presents the second major stress facing coastal communities. This transformation has lead to a shift from rural industry-based economies to urban service, knowledge and technology sectors across Canada and much of the economically developed world. As a result, additional disturbance such as climate change is expected to disproportionately impact rural resource dependent communities (Vasseur & Catto 2008). While neither Shelburne nor Queens County depend exclusively on fishing, the fishery and related industries such as boat building and lobster holding facilities comprise an important part of the local economy. McClanahan and Cinner (2012, p. 88) outline six primary ways climate change is expected to affect the social, economic and ecological makeup of coastal communities: 1) changes to fish yields, 2) changes to fish distribution, 3) damage to infrastructure, 4) effects on human health and safety, 5) changes to fish markets, and 6) changes to climate-driven policies that will regulate the fishing industry more tightly. In light of these anticipated impacts understanding how various factors influence adaptive capacity becomes increasingly important if coastal communities are to avoid the most harmful impacts of the social, economic and ecological changes they currently face.

Successful adaptation planning involves looking beyond material dimensions of adaptation, such as relocation, accommodation and protection strategies as mentioned above. While these strategies represent important adaptation measures, a more holistic approach to adaptation must consider how subjective factors such as cultural context, values and beliefs impact the adaptive capacity of an individual or community (O'Brien & Wolf 2010; Perry et al. 2011; Fresque-Baxter & Armitage 2012; McClanahan & Cinner 2012; Adger et al. 2013). Such an approach is decidedly more difficult for decision-makers as it is harder to assess factors based on subjective, often subconscious preference, and therefore, to measure what constitutes successful adaptation. However, looking beyond material dimensions results in more realistic solutions to climate and socio-economic change that impacts coastal communities (O'Brien & Wolf 2010; Adger et al. 2013). The inability of academics and decision-makers to address the socio-economic factors of adaptation has been shown to limit the effectiveness of climate change adaptation strategies by ignoring the societal norms and values that motivate individual behaviour (Adger et al. 2011). Sense of place is one such example of a socio-economic

dimension of adaptive capacity, and one that is frequently overlooked by decision-makers involved in planning for coastal change and adaptation.

Connections to geographic place and community are fundamental elements of human societies, and determine how individuals understand their role or 'place' in the world (Tuan 1977). Place can be defined as comprising physical location, social milieu and emotional bonds (Agnew 1987 as cited in Devine-Wright et al 2015). People often define their personal identity in relation to the places they inhabit (Proshansky 1978; Proshansky et al. 1983), ranging from local to global places (Tuan 1977; Hidalgo & Hernandez 2001; Devine-Wright et al. 2015). For example, a resident of Halifax might identify as being part of a specific neighbourhood (ie. North-ender), city or town (ie. Haligonian), region (ie. Nova Scotian), Country (ie. Canadian), and/or the globe (citizen of earth). Individuals may choose to identify differently in different contexts and around different people. The idea of person-place bonding is referred to in the literature by terms such as place identity (Twigger-Ross & Uzzell 1996), place attachment (Hidalgo & Hernandez 2001; Scannell & Gifford 2013) and sense of place (Tuan 1977; Cresswell 2004). These terms are often used synonymously. For the purposes of this research, the term 'sense of place' is used to capture the emotional, spiritual, conscious and subconscious bonds people form with the places they inhabit.

Sense of place, or variations of this concept, have been used to study climate change attitudes and opinions (Scannell & Gifford 2013; Devine-Wright et al. 2015), impacts of climate change on places people care about (Van Haaften & Van De Vijver 1998; Adger et al. 2013), and how people respond to the impacts of climate change (Marshall et al., 2012; Adger et al., 2013). Adger et al. (2009) point out that thresholds exist for traditional adaptation options in the form of values and ethics, perceptions of risk, knowledge and culture, all of which present social limits to adaptive capacity. Furthermore, factors such as social identity, perception of risk, and perceived self-efficacy, impact how people make specific adaptation decisions (Adger 2003; Frank & Eakin 2011; Lieske et al. 2014). Climate change can pose risks to places and objects that people care about, instigating an emotional response (Adger et al. 2009). Thus, adaptation decisions are often based on what people feel is worth preserving as well as the degree to which they perceive places they care about to be at risk (O'Brien & Wolf 2010). Adaptive capacity and adaptation is based not only on what people value but also on their perception of their ability to

affect the outcomes of change, referred to as their perceived self-efficacy (Grothmann & Patt 2005). These subjective factors include elements of sense of place.

Therefore, in addition to material attributes of adaptive capacity it is important for governance institutions and management to implement policies that enhance the ability of social and ecological systems to adjust to the impacts of change (Perry et al. 2010) by considering values, identity, perceptions of risk, and perceived self-efficacy.

1.2   Research Questions and Objectives

Within Canada, many coastal communities in the Atlantic Provinces embody a profound attachment to place exemplified in regional history, art, music, livlihoods, and daily conversation. The quotation at the beginning of this chapter from the traditional Nova Scotia folk song Farewell to Nova Scotia, exemplifies attachment between individuals and place. The song personifies the Province by suggesting it could "*heave a sigh and a wish for me*", presumably in the same way the singer heaves a sigh in longing for Nova Scotia while away at sea (the song was supposedly written for those leaving for war, but could reasonably be applied to those at sea on extended fishing trips). As such, this region is a logical location to study sense of place. Sense of place varies from individual to individual, yet it remains an important aspect of community and regional identity. Sense of place can either improve or hinder the ability of Atlantic coastal communities to adapt to the impacts of change. Academic literature suggests that strong person-place attachments reinforce adaptive capacity (Fresque-Baxter & Armitage 2012; Adger et al. 2013). However, more empirical research is required to better understand what this interaction looks like in an Atlantic coastal community context where fisheries are still economically and culturally important.

My research uses sense of place as a lens through which to understand adaptive capacity. Specifically I present why sense of place can be an effective way to understand the socio-economic attributes of adaptive capacity. Arguably many other lenses could be effectively applied, but for the purposes of this research I have chosen to look specifically at how sense of place influences adaptive capacity.

My research project addresses the question: How might individual and/or collective sense of place influence the adaptive capacity of coastal communities to simultaneous social, economic, and ecological change? Specifically, three objectives frame this research:

a) to document multigenerational perceptions of social, economic and ecological change
in selected Nova Scotia coastal communities;

b) to identify and analyze experiences of adaptive capacity and sense of place and reveal
links between these two concepts that influence the ability of individuals and
communities to adapt to change;

c) to synthesize results for community leaders and decision makers in local, provincial
and federal agencies.

Governments at all levels must initiate adaptation planning in order to move beyond
autonomous, reactive decision making as described in Section 2.2 (Smit & Wandel 2006).
Badjeck et al. (2010) suggest that to cope with the impacts of climate change on fisheries and
coastal communities, decision-makers must 1) implement policies that build assets and reduce
vulnerability, 2) understand how individuals and communities currently respond to climate
change, 3) recognize the opportunities climate change could bring, 4) consider a multi-sector
approach to adaptation, and 5) recognize that fisheries can contribute to climate change
mitigation strategies. Paschen and Ison (2014) go one step further to suggest that decision
makers need to not only consider a context specific values-based approach, but also develop
policies that are constructed around narratives. Their research explains that eliciting people's
stories about change and adaptation actually creates self-identity and affects perceptions of risk
and perceived self-efficacy by allowing people to situate their individual experiences within a
larger 'story of change'. Within the Province of Nova Scotia several organizations and levels of
government are taking action to plan for the anticipated impacts of climate change along with the
socio-economic challenges they face. One such initiative comes in the form of Municipal
Climate Change Action Plans (MCCAPs). As described in further detail in section 4.5.5,
MCCAPs are designed to outline strategies to mitigate and adapt to the anticipated impacts of
climate change at the municipal level (Canada-Nova Scotia Infrastructure Secretariat 2012).
Conveniently these plans were being developed during the course of this research, providing an

opportunity to offer research findings to municipalities within the study site for use in their MCCAP reports.

1.3   Research Design

To address the three research objectives, my research project adopts an inductive, qualitative methodology. I approached this research project with a set of general questions, but specific research questions and hypotheses were determined throughout the data collection process based on participants' experiences, perceptions and opinions (Bryman et al. 2012). This approach allows me to develop a set of relevant research questions and objectives that have been informed by the people who are most familiar with their communities; namely fishers, local independent business owners, harbour supervisors, local level government personnel and youth. I employ qualitative methods of participant observation, semi-structured interviews, and photovoice in order to elicit participants' experiences. I rely on a single case study approach as it allows in-depth detailed assessment of a single site (Yin 2011). Investing extended time in one site allowed relationships to build between participants and myself, thereby increasing trust and consequently enhancing the depth of interviews. The photovoice method has been used by researchers to engage traditionally difficult to reach groups by using photos rather than formal interviews to gather data (Carlson et al. 2006) . In my research project context, youth between the ages of 15-19 were the difficult to reach population. By asking youth to take photos of places that are important to them and places where they would like to see change, I was able to use their photos to 'break the ice' in conversation and to establish a less intimidating environment than if I had conducted a traditional interview. Further information on research design and methods is provided in Chapter 3.

1.4   Case Study Context

The Atlantic Provinces of Newfoundland and Labrador, New Brunswick, Prince Edward Island, and Nova Scotia possess geographic and cultural similarities. Currently the four Atlantic Provinces cumulatively house 2.4 million residents, or 6.8% of the entire population of Canada (Statistics Canada 2014a). Unemployment rates in Atlantic Canada are some of the highest in the country, and range from 9.0% in Nova Scotia to 11.5% in PEI, as compared to 7.1% nationally (Statistics Canada 2014b).

Historically, groundfish (primarily cod, haddock, redfish and halibut) were the mainstay of the Atlantic fishery. Early European colonizers wrote about arriving to the waters off the East coast of present-day Newfoundland and seeing the waters teeming with fish, almost as if you could walk across the water on their backs (Kurlansky 1998). Towards the end of the twentieth century, groundfish stocks, and particularly codfish, were in drastic decline due to mismanagement and overfishing. In 1992, a complete moratorium was implemented on the northern cod fishery, located primarily on the Grand Banks of Newfoundland and Labrador. Although the other three provinces were not under moratorium they experienced significant cuts to their quota allocation for all species of groundfish (Charles 1007). Eventually, it was financially unfeasible for most longline groundfishers to continue fishing. Over the last two and a half decades since the groundfish collapse, the Atlantic Provinces (including coastal areas of Québec) have collectively moved away from groundfish and towards shellfish (ie. lobster, crab, shrimp) as a primary source of income for fishers (see Table 1.1).

Table 1.1: Fish landings in Atlantic Canada (including Québec) in 1990 and 2013 (Numbers taken from DFO 2014a).

Species	1990	2013
Groundfish Landings (Metric tons, live)	647,642	75,113
Groundfish Value	$388 million	$165 million
Pelagic Landings (Metric tons, live)	422,267	169,938
Pelagic Value	$88 million	$111 million
Shellfish Landings (Metric tons, live)	229,864	434,933
Shellfish Value	$476 million	$1.7 billion

The research project site is comprised of a series of small communities along an undulating strip of the South Shore coastline within Shelburne and Queens counties. The major population centres include the community of Liverpool (population 2,653)—formerly a town before municipal amalgamation in 1996, the Town of Shelburne (population 1,686), and the Town of Lockeport (population 588) (Statistics Canada 2011a). The area is based on a history in the fishery and fishing-supported industries. The Town of Shelburne was known for its superior dory boat builders. The Town of Lockeport is an historic fishing community and was an important supply stop for fishing boats traveling from the Eastern United States to the Grand

Banks of Newfoundland. In the past, numerous fish processing plants dotted the entire length of the study site.

The South Shore of Nova Scotia, from Halifax to Digby Neck have some of the highest landings of American lobster per vessel in the world (DFO 2007). As a result, the area has a reputation for containing some of the wealthiest fishers in the province, both groundfishers and lobster fishers. This is at least partially due to their proximity to the abundant George's Bank, and their six-month lobster season where other regions can only set traps for between two to five months (DFO 2011a). The most profitable lobster fisheries are concentrated just west of the study site in lobster fishing area (LFA) 34. This area is politically contentious due to high lobster landings and its ability to influence the lobster market throughout the province (Thériault et al. 2013). This area includes the historically profitable fishing communities of Cape Sable Island, East and West Pubnico, Yarmouth and Digby Neck.

Outside of fishing related employment in the study site, Steel and Engine Products Ltd, Mersey Seafoods and the former Bowater-Mercy Paper Company Ltd provided a number of jobs in the Liverpool area (Coastal Communities Network 2004). The closure of Bowater in June 2012 was an economic shock to that community. There is some tourism in the area, however, tourism numbers were down at the time of my research project due partially to the closure of the Yarmouth-Maine ferry, which has since reopened. Away from the coast, small woodlot and sawmill operations exist, but these were impacted heavily by the closure of the Bowater facility (Ware 2012). There is one shellfish and eight finfish aquaculture sites along the study site. Aquaculture is a divisive issue in many communities throughout Nova Scotia, dividing those who prioritize job creation from those who prioritize the commercial wild fishery and a pristine environment. The community of Port Mouton, located within the study site, has been a particularly strong leader in fighting against open-cage aquaculture facilities and lobbying for stricter regulations (Friends of Port Mouton Bay 2014). Although this research project was conducted on the South Shore of Nova Scotia, many of the results may be broadly applicable and generalizable at a regional level. More detailed information on the case study context can be found in Chapter 4.

1.5 Thesis Structure

Seven chapters make up the content of this thesis. Chapter 1 has provided an overview of the problem context and the gap this research project aims to fill, defines the research question

and objectives, along with providing a brief glimpse of the research design and case study context on which this project is based. Chapter 2 presents a literature review of relevant academic literature as well as government and not-for-profit reports on the topics presented in this thesis. The literature review serves to provide a theoretical foundation for the data and analysis presented throughout the remainder of this thesis. The main topics covered in the literature review centre around vulnerability, adaptive capacity and sense of place. Chapter 3 outlines the specific methods and methodologies used to conduct this research, in order to demonstrate research robustness. Chapter 4 goes into depth on the case study context including physical, historic and socio-economic settings. A clear understanding of the specific physical and social environment where research took place is particularly important for case study methodologies in order to provide a contextual basis for results. Chapter 5 details specific perceptions of change as communicated by interview participants. These results are broken down into biophysical change, socio-economic change and youth perceptions of change. Chapter 6 covers results focused on interview participants examples of adaptive capacity and sense of place. First this chapter presents examples of socio-economic adaptive capacity followed by experiences of sense of place and lastly instances where elements of sense of place aided or hindered socio-economic adaptive capacity. Chapter 7 highlights the principal outcomes and recommendations from the research project as well as the key contributions my research makes to the communities where this research was conducted. The thesis concludes with reflections on future research opportunities and my personal experiences with this project.

Chapter 2:   Literature Review

"The storms are getting bad, the wind and the seas and stuff
are getting really bad. If fishin' were wide open like it was
years ago, you'd a lost a lot of men this winter."

Shane Blinkhorn, Lower Sandy Point

Coastal communities have a front row seat to observe the impacts of climate change. The International Panel on Climate Change 5th Assessment Report indicates that marine fish and invertebrates will experience species redistribution and reduced productivity and that low-lying coastal areas are at increased risk of submergence, flooding and erosion due to sea level rise (IPCC 2014). Furthermore, coastal communities are faced with expected ocean warming and acidification and increased storm frequency and intensity (Manuel & Perry 2009).

Climate change-related risks contribute to social-ecological system vulnerability. Vulnerability is determined by exposure and sensitivity to risk and the ability to adapt to change in order to avoid negative impacts (Smit & Wandel 2006). Climate change presents an important cause of vulnerability, particularly in low-lying coastal communities. However, climate change is not the only driver of change facing these communities. Socio-economic changes, often driven by globalization, include increased standards of living, global trade and cheap air travel (Leichenko & O'Brien 2008). Climate change and socio-economic change affect vulnerability in tandem. While both forms of change present some positive opportunities, their cumulative effect on vulnerability is often negative.

The ability of individuals and communities to respond to change by adapting to new circumstances decreases their vulnerability (Smit & Wandel 2006). Therefore, when considering how to reduce vulnerability it is important to look at the factors that either improve or present barriers to adaptive capacity at an individual and community level. Adaptive capacity includes both physical and socio-economic attributes. Physical attributes include access to resources, modern technology, infrastructure, and effective institutions (Smit & Plifosova 2003; Armitage 2007; McClanahan and Cinner 2012). These attributes of tend to garner a lot of attention from decision makers and municipalities because they are easily quantifiable. However, there are also socio-economic, values-based attributes that influence the ability of individuals and communities

to adapt to changing conditions. These include knowledge sharing, the ability to act collectively, social networks and income flexibility (Smit & Plifosova 2003; Armitage 2007; McClanahan and Cinner 2012). Although the subjective attributes of adaptive capacity tend to receive less attention from decision makers, they represent an important contribution to overall adaptive capacity (O'Brien & Wolf 2010; Wolf et al. 2012). The concept of person-place bonds is one socio-economic attribute that is beginning to generate interest among researchers.

Although many different terms are used to describe person-place bonds in the literature, I opt for the term 'sense of place' in this thesis. Sense of place refers to the emotional and spiritual bonds people form with physical and social environments and the resulting way they understand the world and their place in it (Relph 1976; Tuan 1977; Tuan 1980; Cresswell 2004). Sense of place within a community can develop both a strong sense of belonging or of exclusion depending on the circumstances (Relph 1976; Tuan 1980; Cresswell 2004). People's connections with place influence their perceptions of what is changing, the importance of the physical and social environments affected by change and their willingness to adapt (Grothmann & Patt 2005; Wolf & O'Brien 2010; Fresque-Baxter & Armitage 2012).

My research project examines adaptive capacity through the lens of sense of place. This chapter covers the concepts of vulnerability, adaptive capacity, sense of place and the links among these concepts. It ends with a conceptual framework that guides the research objectives and the presentation of results throughout this thesis. The literature I present in this chapter provides the theoretical backdrop for the methodology, results and analysis of my research project.

2.1 Vulnerability to Change

Human vulnerability to climate change is a function of exposure, sensitivity to the exposure and the adaptive capacity of human communities (Smit & Wandel 2006; McClanahan & Cinner 2012). High exposure and sensitivity to exposure increase vulnerability to climate change, while increased adaptive capacity decreases vulnerability (Smit & Wandel 2006). For example, increased storm frequency (exposure) in combination with decaying wharf infrastructure (sensitivity) increases harbour vulnerability. However, increased funding to maintain and repair old wharves (adaptive capacity) decreases vulnerability. As Smit and Wandel (2006) point out, this does not mean that vulnerability can or should be quantified by

developing a predictive formula. Vulnerability exists on multiple levels and time scales ranging from individual to global and short-term to long-term.

Biophysical system vulnerability is also based on exposure, sensitivity and adaptive capacity. However, my research project is focused primarily at the intersection of linked social-ecological vulnerability and adaptive capacity. Linked social-ecological systems are characterized by the simultaneous interactions between resources and resource users (Berkes & Folke 1998). This idea stands in contrast to a vast majority of Academic literature that studies either strictly ecological systems (ie. ecology, climate modeling) or strictly social systems (ie. sociology, psychology). Adopting a holistic, systems approach involves considering ecological and human dimensions of vulnerability and adaptive capacity together rather than dealing with each individually (Berkes & Folke 1998; Adger 2000).

Vulnerability is not created solely by climatic conditions. Socio-economic exposure and sensitivity due to the impacts of globalization also influence vulnerability. Leichenko and O'Brien (2008) refer to this idea as 'double exposure', indicating the inextricability of globalization challenges and climate pressures. Issues related to globalization can include a migrant workforce, perceived need for increased consumerism to satisfy well-being, shifting economic conditions and global trade to name a few (Leichenko & O'Brien 2008). Globalization also provides opportunities for innovative communication, technology and governance strategies to develop. For example, increased global communication via the Internet allows individuals facing similar problems around the world to connect and find creative solutions. As with globalization, climate change has both negative and positive outcomes. For example, shifting temperature regimes may provide new agricultural opportunities as global average temperatures increase. 'Double exposure' refers to the need to address the challenges and opportunities associated with both globalization and climate change simultaneously in order to more accurately understand complex interactions of social ecological systems (Leichenko & O'Brien 2008).

Leichenko and O'Brien (2008) raise the question of why individuals, communities and regions most disadvantaged by globalization tend to also be the most vulnerable to environmental change (Leichenko & O'Brien 2008). The authors also point out that individual responses to globalization can impact vulnerability to environmental change, and vice versa (Leichenko & O'Brien 2008). The tension between these two interrelated and interdependent processes add a layer of complexity and challenge to dealing with either concept independently.

It is also important to recognize that individuals and communities may not differentiate climate change impacts from those associated with globalization when they are preparing to adapt (Moerlein & Carothers 2012).

Individuals often respond to vulnerability from a risk management point of view (Wall & Smit 2006). Individual risk perception is a combination of the perceived likelihood of a threat and the expected damage to the things and places one values (Grothmann & Patt 2005). These two factors are important in motivating adaptation decisions at the individual level. Threat impacts could include the perceived likelihood of extreme storm events like hurricanes and blizzards, or the possibility of major flooding. Values also play an important role in risk perception (Grothmann & Pratt 2005). For example, one might be less concerned about the possibility of erosion damage to an unused corner of land and more concerned about losing waterfront beach access. Likewise, individual perceptions of how much control one has over the outcomes of climate change influence the actions an individual is willing to take. Perceptions of control over climate change can be a challenging factor to motivate adaptive behaviour because many perceive climate change as a global problem that the individual has little control over (Devine-Wright et al. 2015). This attitude is understandable considering the focus the media places on climate change impacts rather than adaptation (Wall & Smit 2006). For example, Wall and Smit (2006) examined Ontario farmers' perceptions of climate change adaptation and found that while farmers are interested in adaptation from a risk management point of view, they are resistant to the idea of climate change adaptation specifically. This result highlights the importance of framing climate change vulnerability as inextricable from other drivers of change.

Individual perception influences decisions that may increase exposure and sensitivity to environmental change. For example if one perceives the ocean as peaceful and calming s/he may choose to build a home or summer cottage in close proximity to the coast, or in some cases directly on the beach. Academic literature shows that people tend to underestimate the likelihood of environmental damage to their home (Kunreuther 1996). Thus, perception of risk can increase exposure of a particular home or cottage to the impacts of increased erosion, flooding and storm damage. It follows that vulnerability increases not just for the individual but also for the community responsible for providing disaster relief and emergency response. Consequently, how people evaluate information about climate change affects how they choose to respond.

Information evaluation is not, however, based entirely on objective analysis of scientific evidence. Historically, Academic literature has focused on climate change impacts, vulnerability, and adaptation in terms of quantifiable physical and socio-economic influences. But increasingly, research is pointing to subjective values being both impacted by climate change and also influencing adaptive capacity (O'Brien & Wolf 2010; Wolf, Allice, & Bell 2012; Adger et al. 2013). O'Brien and Wolf (2010) point out that risk perceptions differ based on individual experiences and perceived consequences of environmental change. In addition to values impacting how people respond to climate change, climate change will in turn affect peoples' way of life, impacting what they value and the places they care about (Wolf et al. 2012; Adger et al. 2013). As a result, O'Brien and Wolf call for a 'values-based approach' to climate change adaptation and vulnerability research (2010). They argue that in order to more fully understand the true impacts of climate change, research must consider what climate change means for an individual's "cultural identity and way of life, their sense of place, their visions for their future, and their human security" (p. 237).

2.2   Adaptive Capacity

In order to talk about adaptive capacity one must first look at the concept of adaptation as adaptive capacity is expressed through specific adaptation decisions (Smit & Wandel 2006). In a climate change context, adaptation can be defined as "actions undertaken to reduce the effects of climate stresses on human and natural systems" (McClanahan and Cinner 2012, p. 4). Adaptation decisions can occur at various spatial and temporal scales from individual to global and short-term to long-term. Moreover, adaptation can be anticipatory or reactive and autonomous or planned (Smit & Wandel 2006). Autonomous, reactive adaptation could include a municipality's initial response to an unexpected flood event, while the same municipality creating a detailed emergency response strategy would be an example of anticipatory, planned adaptation. While both forms may be necessary at different times, anticipatory, planned and context specific adaptation plans for individual communities are a useful adaptation tool. Arguably this is most effectively done using a "bottom-up" approach whereby communities define their own exposures and sensitivities, giving adaptation strategies more local legitimacy (Smit & Wandel 2006).

Climate change adaptation literature often looks at policies, funding and institutions that encourage successful adaptation with little focus on the social and psychological factors

(Gothmann and Patt 2005). While adaptation literature has contributed important strategies and conditions for coping with change, accounting for the socio-economic attributes that determine if, when and how humans are able to adapt, known as their adaptive capacity. Adger et al. (2009) recognize that various individuals and communities may make different adaptation decisions given the same set of options as a results of diverse cultural values, political context and economic conditions. Adaptive capacity can be defined as "the conditions that enable people to (1) anticipate and respond to change, (2) minimize and recover from the consequences of change, and (3) take advantage of new opportunities" (McClanahan & Cinner 2012, p. 72). Adaptive capacity can refer to any number of situations or conditions including biophysical conditions (for example, the ability of a forest to adapt to new conditions after a forest fire) or social conditions (the ability of a person to adapt to a new situation). This research project refers to adaptive capacity primarily as the ability of communities to adapt to changing social, economic and environmental conditions, including but not limited to climate change.

Adaptive capacity depends heavily on individual and community perceptions of the exposure conditions they face (Grothmann and Patt 2005). Grothmann and Patt (2005) outline three components of perceived adaptive capacity: 1) perceptions of the results that a particular adaptive action will have on reducing vulnerability (*perceived adaptation-efficacy*), 2) the perceived ability of the individual to actually carry out the adaptive action (*perceived self-efficacy)*, and 3) the perceived cost (monetary, time, effort) of implementing the adaptive action (*perceived adaptation-costs*). According to this perspective, adaptive capacity can be greatly influenced based on a series of socio-psychological factors that can change from individual to individual. These represent socio-economic attributes of adaptive capacity, which are explained in more detail in Section 2.2.2 below.

2.2.1   Physical Attributes of Adaptive Capacity

The majority of adaptive capacity literature looks at physical attributes that aid or inhibit the ability of a particular group or individual to adapt to change. As indicated in Table 2.1 decision makers often rely on the material, quantifiable attributes of adaptive capacity such as economic resources, access to technology, available information and skills, physical infrastructure and robust institutions to determine the ability of a region or community to adapt to climate change (Smit & Plifosova 2003; Armitage 2007; McClanahan and Cinner 2012). For

example, economic adaptations can include reallocating resources to adaptation initiatives such as emergency response funding to handle impacts from increased flooding and storms. Technological adaptations include early warning systems, buildings designed to withstand greater impacts, and building dykes to protect against storm surges (Leichenko & O'Brien 2008). Political adaptations may include policies designed to regulate shoreline development such as indicating acceptable activities for designated shoreline setback zones in New Brunswick (Government of New Brunswick 2002). Income has been considered one of the most important physical attributes of adaptive capacity (Yohe and Tol 2002). This finding would suggest that physical, measurable outcomes such as wealth best predict the ability of individuals and communities to adapt to change. However, an analysis of this study revealed wealth became a less important predictor of adaptive capacity when homeownership and its resulting impact on household motivation and self-efficacy were taken into account (Grothmann and Patt 2005). These results suggest that adaptive capacity is not solely determined by physical, measurable attributes. Moreover, Adger et al. (2009) point out that values and ethics, risk, knowledge, and culture all present social limits to the physical attributes of adaptive capacity. Specifically, Adger et al. (2009) highlight how ethics, knowledge, risk and culture affect adaptive capacity in addition to more frequently considered physical factors such as ecological, economic and technological limits. Economic, technological, and political adaptations are important, however, alone these three material attributes ignore key socio-economic factors that contribute to adaptive capacity.

2.2.2 Socio-economic Attributes of Adaptive Capacity

Recently, researchers and decision makers are drawing more attention to the social, value-laden attributes of individual and community adaptive capacity (O'Brien & Wolf 2010; Wolf et al. 2012). However, these attributes remain relatively poorly understood (Adger 2003; Paschen & Ison 2014; Poe et al. 2014). A review of relevant literature suggests these socio-economic attributes include equity, knowledge, resilience of local institutions, strength of formal and informal social networks, power imbalances, flexibility, ability to organize and act collectively, and social learning (Smit & Pilifosova 2003; Armitage et al. 2007; Armitage et al. 2009; McClanahan & Cinner 2012) (see Table 2.1).

Table 2.1: The material and socio-economic attributes of adaptive capacity. Each attribute offers a point where adaptive capacity of a social-ecological system can be influenced.

Material Attributes	Socio-economic Attributes
•Economic resources[1,2,3]	•Equity[1,3]
•Access to context relevant technology[1,2]	•Knowledge[2]
•Information and skills[1,2]	•Resilience of local institutions[2]
•Infrastructure[1,2]	•Strength of formal and informal social networks [1,2]
•Institutions[1]	•Income flexibility[3]
	•Ability to organize and act collectively[3]
	•Social learning [1,3]

[1] Smit& Plifosova 2003; [2] Armitage 2007; [3] McClanahan and Cinner 2012

Additionally, factors such as social identity, perception of risk, and perceived self-efficacy impact how people make specific adaptation decisions (Adger 2003; Frank & Eakin 2011; Lieske et al. 2014). Although more subjective and difficult to measure than material attributes, recognizing the multi-dimensional nature of adaptive capacity allows a more thorough understanding of complex social-ecological challenges such as climate change (Ostrom & Cox 2010).

Framing adaptive capacity research to include values and more intangible or subjective dimensions recognizes that inspiring adaptation action requires understanding what people care about (Adger et al. 2011). Adaptive capacity requires understanding what individuals and communities value and are willing to protect (O'Brien & Wolf 2010). Importantly, knowing where individual and collective actors derive their identity and self-meaning highlights where their commitments lie (Burke & Reitzes1991). Thus, adaptation decisions are based on what people perceive to be worth preserving and the degree to which they consider themselves at risk (O'Brien & Wolf 2010). As indicated at the beginning of this section, Grottman and Patt (2005) highlight how adaptation action is based heavily on individual perception. As Adger (2003, p. 401) points out:

> *When actors perceive adaptation to and the risk of climate change as being within their powers to alter, they will be more likely to make the connection to the causes of climate change, thereby enhancing their mitigative, as well as adaptive, capacity.*

As vulnerability to social, economic and environmental change increases in light of climate change projections and globalization (Leichenko & O'Brien 2008) it becomes ever more important to understand the intricacies of effective adaptation and the factors that influence adaptive capacity. A better understanding of the subjective attributes of adaptive capacity at the household and community level is imperative considering the lack of research in this domain (Adger 2003; Adger et al. 2009; O'Brien & Wolf 2010; Ostrom & Cox 2010; Fresque-Baxter and Armitage 2012). This thesis focuses on the links between the concepts of sense of place and adaptive capacity as one of many avenues from which to consider the socio-economic attributes of adaptive capacity. Section 2.3 provides background on sense of place theory followed by an explanation of the theoretical links between sense of place and adaptive capacity in Section 2.4.

2.3   Understanding Sense of Place

Writings on 'place' are broad and diverse spanning multiple disciplines including psychology, philosophy, urban planning, architecture, and geography, each offering slightly different definitions and applications of the concept (Patterson & Williams 2005). This research project focuses mainly on place literature within the human geography field. However, understandings of place from other disciplines are useful for considering the origins of certain concepts or contrasting common perceptions in different fields.

Very little agreement exists regarding terminology within place literature (Pretty 2003). The terms 'place attachment' (Tuan 1974; Relph 1976; Tuan 1977; Williams et. al 1992), 'place identity' (Proshanski 1983; Burke & Reitzes 1991; Stedman 2002; Cresswell 2004; Dixon & Durrheim 2007; Fresque-Baxter & Armitage 2012) and 'sense of place' (Relph 1976; Tuan 1977; Tuan 1980; Cresswell 2004) have been used to describe various elements of connections between the physical environment, human behaviour, and social or psychological processes (Stedman 2003). From my review of the literature I understand place identity as the cognitive understanding of the physical environment reliant on an individual's values, ideas, and attitudes (Proshansky et al. 1983; Cresswell 2004; Droseltis & Vignoles 2010). It is an element of self-identity and reflection on this idea determines how an individual understands their personal roles and responsibilities in a given place (Stedman 2002). Place attachment on the other hand reflects varying degrees (strong to weak, and positive to negative) of emotional connection people have

with specific locations based on personal experiences, memories, and associations. Tuan (1974) for example, refers to this attachment as '*topophilia*'. I understand the term 'sense of place' to include both place identity and place attachment, referring to the emotional and spiritual bonds people form with physical and social environments and the resulting way they understand the world and their place in it (Relph 1976; Tuan 1977; Tuan 1980; Cresswell 2004). An individual's sense of place influences the way s/he understands the world and her/his place in it (Cresswell 2004). This definition of sense of place builds on foundations established by philosophers such as Aristotle, Heidegger, Husserl and Merleau-Ponty, and is consistent with concepts of place in human geography research (Tuan 1977, Cresswell 2004). While I rely on this definition throughout this thesis, I acknowledge that it is difficult to operationalize a theoretical concept like sense of place. Despite the lack of clearly defined terminology in this field, researchers cannot necessarily be criticized for their lack of consensus considering the constantly evolving nature of philosophical thought; on the contrary the lack of clarity may suggest the depth of this theoretical concept (Patterson & Williams 2006).

Early place literature focused primarily on the influence of 'shared behaviours and cultural processes' (Stedman 2003 p. 671) on individual and community connections to place. A more modern approach to research in this field includes the influence of the physical environment on connections to place (Relph 1976; Tuan 1977; Stedman 2003). However, physical location does not foster sense of place on its own; this development depends on social interactions between people and places (Pretty et al. 2003). Some studies take a quantitative, model-based approach to place research, using measurable outcomes to define human-place interactions (Williams & Vaske 2003; Droseltis & Vignoles 2010). However, as a highly individualistic, constantly changing concept, sense of place may not best be understood through static models (Patterson & Williams 2005). Rather, a qualitative, experiential approach to place, that allows unexpected concepts to emerge iteratively from the data, have become the widely accepted approach to understanding individual and communal sense of place (Relph 1976; Tuan 1977; Stedman 2002).

2.3.1 Phenomenological Roots

Galileo and Descartes were two important fathers of scientific thought. They saw mathematics as the only objective science; to them reality was concrete, measurable and

everyone's experience of it was identical. Things like colour and taste were open to interpretation and thus unreliable. Theirs was a positivist approach to knowledge. In the early 20th century, Edmund Husserl and a group of German thinkers challenged this method of scientific discovery (Cresswell 2004). They attempted to study the subjective, venturing into the realm of judgements, perceptions and emotions. Foundational texts like Husserl's *Logical Investigations* (1970) and Merleau-Ponty's *The Phenomenology of Perception* (1962) posited that reality might in fact vary depending on perspective and consciousness. This was a constructionist approach to knowledge that became known as Phenomenology (Cresswell 2004). Phenomenology deals with existential existence, recognizing various nodes of reality exist in each sentient being and that one perspective of reality may differ from another, but that does not mean it is any less of a reality (Manzo 2003). Research taken from a phenomenological perspective aims to analyze specific experiential examples in order to draw generalizable insights about human behaviour, meaning and existence (Seamon 2000). Phenomenology is an important starting point for research on sense of place because physical and social environments are vital to human experience and perception (Manzo 2003).

2.3.2   Place and the Individual

In the 1970's Edward Relph and Yi-Fu Tuan shifted the focus of place literature from studying regions and areas with finite geographic boundaries to more individually subjective concepts of how one experiences and understands the world (Relph 1976; Tuan 1977; Cresswell 2004). Beginning at birth, humans associate symbolic meaning with the space they inhabit (Tuan 1977). Gradually a sense of place develops as the child begins to endow meaning to and understand their role within the world around them. This process of developing sense of place relies on multiple external factors present in the physical and social environments one inhabits (Tuan 1977).

Sense of place includes both conscious and subconscious societal influences. Society shapes the way people experience place, but individual expression of sense of place also shapes society and cultural values (Cresswell 2004). Social norms and expectations influence where people experience an emotional connection to place. Yet social norms are made up of many individual experiences based on interpretation of belonging and place identity. Determining whether social norms influence sense of place or sense of place influences social norms is a

'chicken and egg' scenario; contemplating one takes you back to the other in a cyclical thought experiment. At a subconscious level influences such as ancient land use practices shape how we perceive relationships with land, anthropocentric impacts on ecosystems affect the ability to acquire natural resources, and even the use of the English language can affect the universality of an idea or relationship.

As individuals navigate space, giving it meaning and transforming it into place (Tuan 1977), a common reaction is to begin to draw place boundaries that distinguish 'insiders' from 'outsiders' (Relph 1976; Tuan 1980; Cresswell 2004). Inclusion in place can be a conscious identity or result from mundane activities and routine, known as 'existential insideness' (Relph 1976, p. 55). Tuan (1977) explains how strong place attachments and sense of place can develop out of ordinary circumstances:

> *Attachment of a deep though subconscious sort may come simply with familiarity and ease, with the assurance of nurture and security, with the memory of sounds and smells, of communal activities and homely pleasures accumulated over time. It is difficult to articulate quiet attachments of this type.* (p. 159).

In order to define what belongs in a place, or is considered an 'insider', it is essential to know what or who does *not* belong (Cresswell 2004). Belonging is established through engagement in group activities, imagination of an individual and/or group image, and alignment with a particular set of beliefs and values (Wenger 2000). The most obvious examples include teams and clubs, and religious and ethnic groups (Tuan 1974). Insidesness and outsideness is recognized by boundaries that are either consciously or subconsciously identified by a group. These boundaries are essential for developing a sense of place, but can also be reactionary and discriminatory, excluding particular individuals or groups from participation based on deep rootedness to particular ideas and ways of life (Relph 1976; Tuan 1980; Cresswell 2004).

Tuan (1980) differentiates between rootedness—an unselfconscious state of being at home, from sense of place through conscious awareness and appreciation for place. He defines rootedness as "long habitation in one locality…made possible by an incuriosity toward the world at large and an insensitivity toward the flow of time" (p. 4). Deep rootedness can lead to individuals and communities forming exclusionary boundaries. The distinction of who belongs in a place and who is excluded can lead to a sense of right or authority over a particular place.

Feeling a right to a country, region, or town can lead to racism, inequality, and the abuse of power (Cresswell 2004). In a modern North American context, discriminatory boundaries commonly exclude people based on ethnicity, gender, and sexual orientation (Cresswell 2004). Boundaries, however, are not inherently reactionary. In her essay *A Global Sense of Place,* Doreen Massey (1994) suggests a version of sense of place that recognizes 'change' and 'process' with permeable boundaries open to information sharing and social learning. This global understanding of place means that multiple people can live in the same location and not experience it identically. Factors such as gender, age, occupation, and personal history all influence the particular way an individual develops place attachments, place identity, and ultimately sense of place (Massey 1994).

2.4   Linking Sense of Place and Adaptive Capacity

As previously noted in this chapter, different scholars use different terminology for place research. I use the term 'sense of place'; however this research project is based on literature that refers to the connections between adaptive capacity and place attachment, place identity, sense of place or similar terms chosen by each author. Sense of place and its related concepts have recently received more attention as important social attributes of adaptive capacity (eg. Fresque-Baxter & Armitage 2012; Adger et al. 2013). Fresque-Baxter and Armitage (2012) offer three approaches to understanding the connections between person-place bonds and adaptive capacity, specifically related to climate change. First a 'cognitive-behavioural' approach focuses on how individuals' identity with place impacts their understanding of climate change and adaptation responses. A second approach highlights how disruption to place identity as a result of climate change can impact 'health and well-being'. Thirdly, place identity can encourage 'collective action' responses to climate change in the form of adaptation initiatives. Along a similar train of thought, Adger et al. (2013) describe sense of place as one of the multiple cultural dimensions that determine how societies respond to climate change.

My research project is based primarily on the 'coginitive-bahvioural' approach to understanding person-place connections with adaptive capacity (Fresque-Baxter & Armitage 2012). I consider how sense of place impacts individual and collective understanding of climate change and ability to adapt accordingly. As mentioned above, my use of the term 'sense of place' rather than 'place-identity' is a terminology choice based on my understanding of sense of place

as an umbrella concept that includes other more specific terms such as place identity and place attachment. Although much Academic literature on person-place bonds and adaptive capacity focuses specifically on a climate change context, my research project considers multiple drivers of change. Leichenko and O'Brien's (2008) concept of 'double exposures' (described in Section 2.1) implies that few climate change problems are strictly a result of physical impacts to climate. Rather simultaneous social and economic change plays an important role in how climate change impacts are perceived and dealt with.

Socio-economic attributes of adaptive capacity, such as sense of place, are important for understanding how individuals and communities respond to social, economic and ecological change. These attributes highlight that values often shape how people perceive their ability to adapt to the impacts of change (Grothmann and Patt 2005; Wolf et al. 2012). Pelling et al. 2005 describe specifically how considering social capital provides important context for understanding the adaptive strategies individuals and communities pursue. O'Brien and Wolf (2010) also advocate for a values-based approach to climate change adaptation in order to develop strategies that have community legitimacy and buy in. A values-based approach considers how change impacts the innate values of those affected and in turn how values impact people's response to change.

Sense of place has the potential to either positively or negatively affect adaptive capacity. In some circumstances negative impacts might manifest when communities or individuals are so deeply entrenched in traditional ways of doing things that they are unable or unwilling to change their actions (Tuan 1980). It is conceivable that a person showing signs of such deep rootedness might be unwilling to change his or her behaviour in order to stave off the potential impacts of change. Alternatively, the same long habitation in one locality that can lead to path-dependant behaviour also provides a useful vantage point for observing change within an ecological or social environment over time (Tuan 1977). However, Tuan (1977) points out that achieving this vantage point may require removing oneself from a place (ie. moving or traveling) in order to understand a personal experience with place more consciously. Another consequence of rootedness that is likely to encourage adaptive behaviour is 'environmental understanding', or the ability to detect change and predict what particular environmental changes indicate as a result of knowing a place (Proshansky et al. 1983).

Research on the socio-economic attributes of adaptive capacity and values-based approaches to adaptation provide a promising avenue for understanding adaptive capacity more thoroughly. However, this remains an emergent field of research with important gaps left to fill. For instance, much of the socio-economic adaptive capacity research is specific to climate change adaptation, ignoring the multiple other drivers of change such as socio-economic conditions impacted by globalization. Furthermore, sense of place remains a difficult concept to operationalize in primary research data. In this thesis I aim to unpack the relationship between sense of place and adaptive capacity using coastal communities in Nova Scotia as a case study example. Using sense of place as an analytical lens for better understanding adaptive capacity allows insights on the interactions between these two concepts to emerge while in no way suggesting that sense of place is the only way to understand adaptive capacity. Similar analytical lenses have been applied to adaptation research include well-being (Armitage, de Loë, & Plummer 2012) and the livelihoods approach (Allison & Ellis 2001).

Understanding adaptive capacity more fully is pertinent in Atlantic Canada as the impacts of multiple drivers of change including climate change, population decline and economic stress become increasingly obvious. The Nova Scotia study site is well-suited to gather this information due to high levels of coastal exposure as well as a long history of strong person-place bonds. Specifically I focus on the fishing industry within coastal communities. My research project provides examples of the specific ways sense of place impacts four socio-economic attributes of adaptive capacity, namely: flexibility, assets, learning, and social organization. According to Atlantic Climate Adaptation Solutions (n.d.), a joint initiative between the four Atlantic provincial governments and the Federal Government of Canada, Atlantic municipalities are currently looking for ways to "[make] adjustments to the way we live, in order to respond to new opportunities and challenges arising from climate change" (Adaptation section, para. 1). My research project offers insights that will be useful for decision-makers in this region.

2.5   Conceptual Framework

This section outlines how I conceptualize the two major theories I rely on throughout this thesis: adaptive capacity and sense of place. I justify my use of each concept and explain why each is important for my research project. I use this conceptual framework to achieve my three objectives identified in Section 1.2 and to frame the way I present my results in Chapter 6.

Table 2.1 outlines the material and socio-economic attributes of adaptive capacity according to three different sources. One of these sources, McClanahan and Cinner (2012), utilize a four-part framework for understanding socio-economic adaptive capacity that incorporates all elements presented in Table 2.1 in a succinct yet comprehensive format. The four attributes are flexibility, assets, learning, and social organization. Within a fisheries context flexibility refers to aspects of income diversity and innovation in fishing methods. This could include fishing various species, or enhancing gear types. Assets refer to physical and monetary resources to secure improved technology and infrastructure. Learning alludes to identifying the causes of change, for example, realizing that fishing juveniles leads to decreased adult stocks. Lastly, social organization involves solving problems through collective action such as through forming an association to have more political power. I used the McClanahan and Cinner approach to adaptive capacity because it encompasses all the socio-economic attributes outlined in Section 2.2.2 while providing four distinct categories that are conducive to coding detailed interview transcripts in an organized fashion.

Section 2.3 outlines some of the foundational ideas present in the concept of sense of place. In a comprehensive review of place literature Fresque-Baxter and Armitage (2012) describe a set of thirteen "subdimensions of place identity". These elements are articulated as: 1) emotional attachment; 2) environmental skills; 3) self-esteem; 4) self-efficacy; 5) continuity; 6) uniqueness; 7) security; 8) sense of belonging; 9) rootedness; 10) familiarity; 11) social connections; 12) commitment to place; and 13) aesthetic value. I have added 'labour contribution' to this list as a fourteenth attribute. Tuan (1977) describes how "…the built environment clarifies social roles and relations. People know better who they are and how they ought to behave when the arena is humanly designed rather than nature's raw stage" (p.102). This statement does not omit 'nature's raw stage' from potentially providing a sense of place, but rather highlights the importance of human contribution to the land in order for sense of place to develop. Appendix A outlines operational definitions, based on those provided by Fresque-Baxter and Armitage (2012) for all fourteen attributes of sense of place used throughout this thesis. Although my research project refers to sense of place rather than *place identity* as used by Fresque-Baxter and Armitage (2012), this framework was deemed appropriate considering it is a thorough list developed from a literature review of place-based research in multiple disciplines. Thus, it is suitable for research such as mine that does not claim any one particular school of

thought when it comes to place theory. Furthermore, in light of the considerable lack of agreement on terminology in this field (see Section 2.4 for further explanation) the use of 'place identity' or 'sense of place' becomes irrelevant so long as the general concept is consistent.

This thesis refers to socio-economic 'attributes' rather than the 'subdimensions' of place relations as used by Fresque-Baxter & Armitage (2012) to indicate the continual evolution of the characteristics associated with this concept. According to the Merriam-Webster dictionary (2015) a slight semantic difference exists between the words 'sub-dimension' and 'attribute'. A sub-dimension indicates "one of the dimensions of constituent elements that make up the dimensions of an object" whereas attributes refers to "an object closely associated with or belonging to a specific person, thing, or office." Therefore, rather than suggest there are a finite number of dimensions that make up the concept of sense of place, I choose to *attribute* different characteristics with sense of place without indicating any limits on how many characteristics this list might include.

The conceptual framework for linking adaptive capacity and sense of place will be used in the following chapters of this thesis. Chapter 3 outlines how this framework informed the interview protocol (see Appendix B for interview protocol). Chapter 5 and 6 rely on this framework in order to identify and analyze perceptions of change and examples of sense of place and their influence on the ability of individuals and communities to adapt to social, economic and ecological. Lastly, Chapter 7 concludes by using the framework to synthesize the results for communities and community groups, as well as decision makers in local, provincial and federal agencies.

2.6 Chapter Summary

In summary, coastal communities are highly vulnerable to the impacts of climate change such as sea level rise, temperature increases and species migration. However, biophysical climatic changes are not the only challenges affecting the vulnerability of coastal communities. The effects of globalization such as increased consumerism, global trade, and cheap air travel can both add further stress and help find modern solutions to climate change impacts. As a result, it is important to consider multiple drivers of change when studying the vulnerability of a social-ecological system.

In response to both experienced and perceived vulnerability, individuals and communities make adaptation decisions. These decisions range from anticipatory to reactive and autonomous to planned. Adaptive capacity is the ability to respond to change, recover from the consequences of change, and take advantage of new opportunities (McClannahan & Cinner (2012). Physical attributes of adaptive capacity look at economic, technological and infrastructure based approaches to improve responses to change. Increasingly, however, a values-based, socio-economic approach to adaptation and adaptive capacity is gaining recognition as an important factor accounting for complexity within socio-ecological systems.

Sense of place offers one way to understand the values that shape how communities respond to change. Sense of place refers to the emotional and spiritual bonds people form with physical and social environments and the resulting way they understand the world and their place in it. Through the process of ascribing meaning and transforming space into place individuals derive a portion of their self-identity and social belonging from their interactions with and within place. While developing identity and belonging are fundamental to the human experience, exclusionary boundaries can form that define insiders and outsiders in a place.

Factors such as place-identity and sense of belonging influence adaptive capacity at the individual and community level in multiple ways. This thesis focuses specifically on the influence sense of place has on cognitive-behavioural experiences of change and perceptions of one's own ability to adapt. This thesis aims to unpack the links between adaptive capacity and sense of place in order to better understand the socio-economic attributes that influence the ability of individuals and communities to respond to multiple drivers of change.

Chapter 3:   Methods and Methodology

"In some jobs, working in Subway, Tim Horton's, Sobeys, one day
just runs into the other doesn't it? But fishing, you never know what
the weather's gonna throw at you, you don't know what the fishing's
gonna be like, you don't know whether a whale's gonna come…you
just don't know. And to me that's what I like about fishing."

~Peter VanBuskirk, Gunning Cove

3.1   Research Design

This research project adopted a qualitative, case study design, focusing on coastal communities on the South Shore of Nova Scotia. The case study design allows for in-depth research of a particular place and its inhabitants, facilitating a detailed understanding of individual perceptions and experiences (Yin 2003). Any combination of qualitative and/or quantitative methods can be applied to a case study approach (Gorard 2013). This research project relies on evidence from qualitative research results to build an explanation (Yin 2009) of the interaction between sense of place and adaptive capacity. Within climate change research, case study approaches have been used to document perceptions of climate change and examples of adaptation strategies in resource dependent communities such as with the Inuit in Labrador (Wolf et al. 2012), fishers in Norway (West & Hovelsrud 2010), farmers in Tibet (Li et al. 2013), and reindeer herders in Sweden (Furberg et al. 2011). Other studies employ photovoice within a case study site to consider youth perceptions of water resources in the Northwest Territories (Fresque-Baxter 2013), and farmers' perceptions of wetlands in Nova Scotia (Sherren et al. 2012). I also use the photovoice approach in this research project.

Both quantitative and qualitative research methods contribute to a better understanding of climate change adaptation. Decision makers however, tend to rely primarily on quantitative measures of adaptive capacity such as access to material infrastructure and technology. The federal climate change adaptation guide for Canadian municipalities provides an example of this narrow focus by concentrating adaption strategies on "new technology, adjusting planning and investment practices, and revising regulations" (Natural Resources Canada 2010). While

quantifiable results help operationalize adaptation strategies, inductive qualitative research can supplement and enhance quantitative data by highlighting how communities perceive change, which values and cultural norms may promote or inhibit effective adaptation, and willingness to adapt as outlined in Chapter 2. An inductive, rather than deductive, approach to social-science research allows theories and hypothesis to develop from data rather than approaching the research problem with a predetermined hypothesis (Bryman et al. 2012). Inductive research helps highlight subjective socio-cultural aspects of adaptation research that are relevant within the contexts they are studied. The impacts of climate change on factors such as cultural values, ethics, sense of place, perceptions of risk, community cohesion, and identity are increasingly being identified in climate change adaptation research (O'Brien & Wolf 2010; Fresque-Baxter & Armitage 2012; Adger et al. 2013). In addition to pointing out that climate change affects the socio-cultural elements of peoples' lives, Adger et al. (2013) suggest that cultural factors can affect how individuals and communities respond and adapt to change. This research project uses an inductive qualitative approach to understand how sense of place affects adaptive capacity in coastal communities facing socio-economic and ecological change.

As a case study design, the research focuses on an in depth study of a particular population in a specific location (Yin 2003). Although the South Shore case study site may have similarities with other coastal communities in Nova Scotia, the Atlantic Provinces, or internationally, it is impossible to state with any certainty where these similarities lie without conducting a similar study in other regions. My research does not claim that the results from this project exist for everyone in every context. Only the views of the specific people I interviewed are represented here. Common critiques of the case study approach include that it does not allow for comparative analysis (Crona et al. 2013) and that its simple form of sampling and observation does not include pre and post intervention analysis, as an experimental or longitudinal design would (Gorard 2013). However, case studies aim rather for in-depth understanding and gradual generalizability through comparison of multiple study sites (Yin 2003). In some situations case studies can reveal more about the nature of a problem than a less detailed study with a broader range (Bryman et al. 2012). Due to the emotionally sensitive content of sense of place theory, and the time required to build trust and collect the volume of information required from each participant, a case study design was deemed appropriate for this research project.

Understanding sense of place can benefit from in-depth qualitative analysis. This study relies on the concepts of grounded theory to elicit participant lead in-depth conversation around the perceived affects of climate change, adaptive capacity, and connection to place. Robustness in the field of qualitative research requires clearly stating methodological approaches (Nielsen & D'haen 2013) and developing a logical research design (Gorard 2013) both of which are outlined in this chapter. Three qualitative data collection methods were used in order to triangulate research results. Triangulation uses multiple methods to study the same topic in order to improve research robustness and verifiability (Webb et al. 1966). Specifically, this research project relies on 1) participant observation, 2) semi-structured interviews using a community-based vulnerability assessment tool (adapted from Smit and Wandel 2006), and 3) a photovoice activity with youth participants from the study site.

In a systematic review of studies on the human dimensions of climate change, Nielsen & D'haen (2013) found a general lack of methodological clarity. Specifically, many studies lack details on participant demographics, location of interviews and focus groups, definition of the research period, insufficient methodological considerations, and reflection on researcher positionality (Nielsen & D'haen 2013). The authors call for increased clarity in order to further validate the studies in their systematic review and enable better communication between natural scientists and social scientists working on interdisciplinary challenges such as climate change. Moreover, Gorard (2013) criticizes a lack of clearly designed social research projects, explaining that many researchers confuse research methods and research design. Research design goes beyond a qualitative or quantitative methodology, instead focusing on the overarching structure for what the research aims to accomplish (Gorard 2013). The most common research designs are: experimental, cross-sectional, longitudinal, and case study; each of which can be employed in either qualitative or quantitative methodologies (Bryman et al. 2012). Neglect for proper research design can lead to doubt over validity of results (Gorard 2013), thus my research project aims to clearly outline the methods and methodologies employed throughout this study.

3.2 Grounded Theory

Grounded theory developed as an approach to analyze qualitative data (Corbin & Strauss 1990). Grounded theory relies on the themes defined by participants to generate explanations of the results (Rubin & Rubin 1995). This is particularly appropriate for understanding personal

experiences and perceptions of a particular concept, in this case how sense of place links to adaptive capacity. Grounded theory differs from other qualitative methods like analytic induction because it analyzes data at the same time it is being collected rather than occurring as a separate step after data collection (Bryman et al. 2012). For example, throughout the course of this research project I constantly analyzed the information participants provided, looking for new themes and ideas. As new information arose I adapted interview questions and chose future participants accordingly.

Sense of place is a dynamic and subjective concept. As such, it is a topic well suited to a grounded theory approach because it allows individuals to express their experiences of place without being guided by a set of pre-determined themes based on the interviewer's own subjective perceptions. The researcher approaches the interview with a preliminary set of themes or ideas to explore, but grounded theory allows flexibility for themes to emerge unprompted throughout the interviews. Research terminates once data reaches a "saturation point" where information becomes repetitive and no new themes are emerging (Bryman et al. 2012). Coding involves identifying the common themes that emerge from the data. The coding process is ongoing and begins at the start of data collection (Bryman et al. 2012). As interesting concepts and themes come up they are integrated into subsequent interviews. For example, some fishers described conflict regarding where each person stored their traps on the wharf. This issue was unanticipated and subsequent participants were asked about concerns over wharf space. After data collection finished, interview transcripts were coded according to the most common and insightful themes (Bryman et al. 2012). This type of coding allows explanations and theories to develop based on participant contribution (Rubin & Rubin 1995).

Grounded theory provides the basis of my data collection methodology. However, I developed an a priori framework (see Section 2.5) for how to look at the connections between sense of place and adaptive capacity that arose in the interviews. This hybrid approach to grounded theory also provided some initial ideas for what these connections may be and how to identify them.

3.3   Participant Observation

Participant observation occurs when the researcher partakes in a social setting and records the ethnographic details of what they experience (Bryman et al. 2012). Participant observation is

used to gather information about people's behaviour, the nature of relationships among different actors, and common practices and language providing a foundational understanding of the culture of a community (Rubin & Rubin 1995). Initial observation for this research project developed as the result of my experience living in Cape Breton, Nova Scotia during the summer of 2012. The importance of wharves as a community hub in fishing communities and an intense identification and emotional attachment to specific places became obvious in my experience. Although unknown at the time, this experience ultimately became the initial stages of participant observation for this research project.

Initial research days in the study site included participant observation at various harbours throughout the area. Two days were spent driving from one end of the study site to the other, stopping at all identified harbours (Figure 3.1). This portion of the research project occurred mid-May 2013 before the end of the legal lobster season on May 31st. Observation began at 5:00am in order to observe one or two wharves during the time when lobster fishermen were "gearing up" for the day. Of the twenty-three identified harbours, ten were chosen as the focus for this study: Gunning Cove, Shelburne, Lower Sandy Point, Jones Harbour, Lockeport, Osborne, East Side Port L'hebert, Port Mouton, Hunts Point, Brooklyn, and West Berlin. Selection was based on diversity of size (fewer than five boats or more than five boats), ownership (municipal, private, federal), and location aiming for equally spaced representation throughout the study site. Although these ten specific harbours were the initial focus of the research project, willing participants from other harbours were not excluded from the study.

Figure 3.1: Harbours located within the study site. Different shapes indicate wharf ownership (square-government and private, triangle- DFO-SCH, star- community); Colour indicates the main use of the wharf (blue- fishing, red- recreation, purple- fishing and recreation). (Image from Coastal Communities Network 2004).

At each wharf, various features were noted and recorded: the relative condition of the wharf, the number of boats moored, the presence of buyers and other buildings, and any information provided on signs including ownership, rules and regulations, berthage fees, and contact information for the president of the Harbour Authority (HA) Board. This contact information was used to call each Harbour Authority president as an initial point of contact and to gain access to the community of fishermen at each wharf. Furthermore, if fishers were present at the wharf I engaged in small talk about their boats and the success of the fishing season, asking for contact information whenever possible in order to set up interviews at a later date. During this observation period I took photos of the wharves for research purposes but also to show interest in fishers livelihoods. Permission was sought for any photos of people or personal belongings, offering a natural transition to conversation about fishing and ultimately my research interests. The first two days of the research period were strictly dedicated to participant observation, however, throughout the entire study observation helped inform the researcher and guide the direction of the interviews. This included noting conversation themes, sensitive topics, body language, and tone of voice throughout the interview process.

3.4 Semi-Structured Interviews

Semi-structured interviews were the primary source of data for this research project. Interviews adopted a protocol following the community-based vulnerability assessment (CBVA)

approach. Smit and Wandel (2006) describe the CBVA approach as one that "employs the experience and knowledge of community members to characterize pertinent conditions, community sensitivities, adaptive strategies, and decision-making process[es] related to adaptive capacity" (p. 285). This approach relies on assessing a community's current and future vulnerabilities and adaptive strategies while considering its 'adaptation needs and options' and 'expected changes in natural and social systems' (p. 288) that may affect future vulnerabilities. My research project is one part of a broader research program called the Partnership for Canada-Caribbean Community Climate Change Adaptation (ParCA). My research project begins by addressing the first phase of the ParCA strategy: current exposure and sensitivity assessment (Figure 3.2) and offers insight into future adaptive capacity for Phase 2 and some governance assessment for Phase 3.
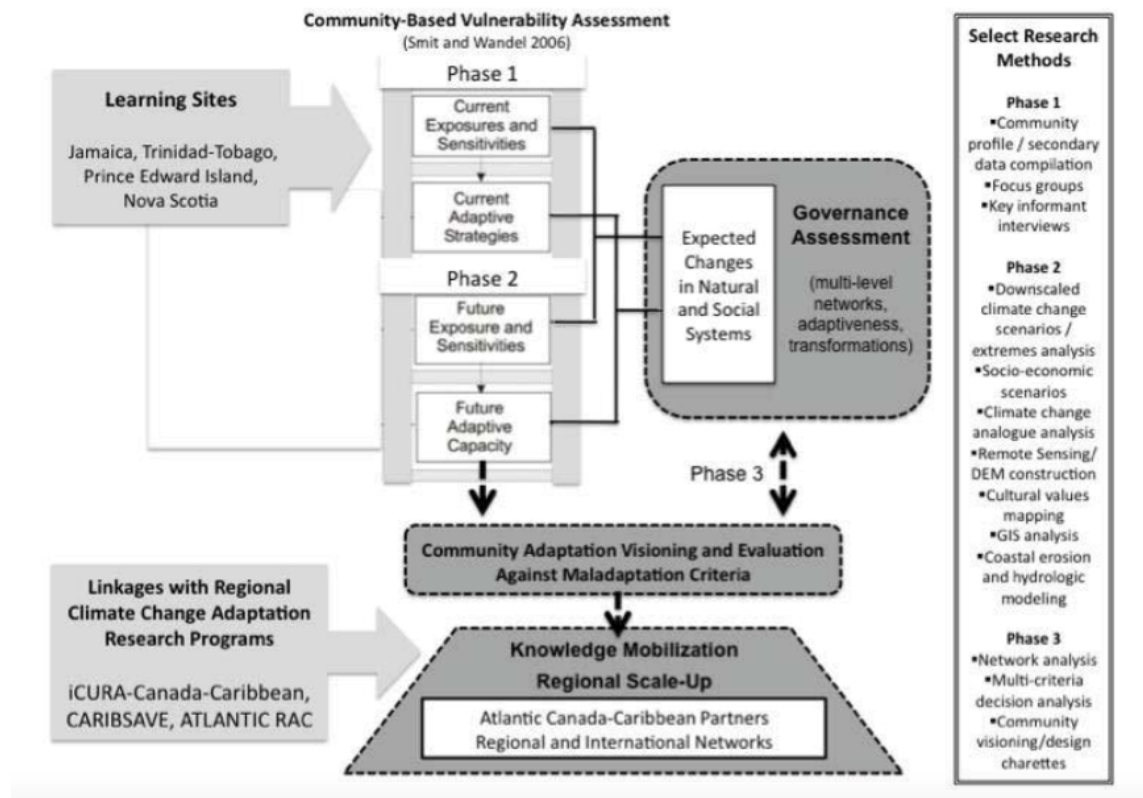
Figure 3.2: The ParCA program framework. (Based on Smit & Wandel 2006).

According to the CBVA protocol for the ParCA site in Tobago, interviews are disaggregated into three parts. These are, 1) general information; 2) open ended questions on exposure sensitivities and adaptive strategies; 3) guided interviewing on specific social, economic and ecological exposure sensitivities and adaptive strategies (Palmer & Wandel n.d.).

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The first of these three categories is designed to set the stage for the interview by asking general contextual questions about participants' personal histories and information about the local fishery. Open-ended questions allow participants to explain exposure sensitivities and adaptive strategies rather than answering 'yes' or 'no' questions. Questions posed to participants help to reveal social, ecological, and economic changes in the community, how individuals have dealt with these changes, and expectations for the future. Question in the third category are designed to probe issues that participants raised but did not elaborate on earlier in the interview, and to ask about specific environmental and social changes identified by other participants.

Questions surrounding what it means to be a social insider or outsider, expectations placed on younger generations, family history in fishing, and place attachment were important to gauge how sense of place develops and is expressed in coastal communities. Additional questions asked how individuals prepare themselves to deal with the impacts of change in order to unpack the relationship between adaptive capacity and sense of place. These questions were integrated into the CBVA interview structure rather than relying on a separate interview protocol for understanding connections between sense of place and adaptive capacity. In accordance with the iterative nature of the research no two participants were asked exactly the same set of questions. Although the CBVA approach follows a linear design with questions neatly categorized, in reality the structure was much more fluid. Rather than saving guided questions for the end of the interview, I often probed an issue when a participant initially introduced the subject. This change allowed for a much more natural progression of the conversation and thus arguably provided richer information than may have otherwise arisen. For example, some participants eagerly spoke about groundfish quotas, expressing what they perceived to be an unjust allocation system. Although this information was not directly relevant to the research project, some participants were more open to the interview after having the opportunity to express their frustration at the beginning. This process was not necessary for all participants and was gauged on an individual basis. As such, the interview guide (Appendix B) provided possible questions and conversation topics, but was not strictly adhered to.

Interview participants represented a broad set of actors including fishers (lobster, groundfish, swordfish, longline, and seaweed harvesters), fish buyers, members of harvester associations and Harbour Authorities, as well as DFO personnel and harbour supervisors. In total 36 interviews were conducted over the course of three months from May-July 2013 (**Table 3.1**). In

addition to those contacted during the observation phase, ParCA's community partners from the Ecology Action Centre (EAC) and the Municipalities of Queens and Shelburne helped identify potential interview participants who in turn provided additional contacts in a recruitment technique known as snowball sampling (Bryman et al. 2012). The interview participants included both men and women when possible, although only one female fisher was identified in the study site. Participants' ages ranged from 26-91 years old. Research reached a saturation point after approximately three quarters of the interviews were complete, at which point I conducted the remainder of pre-scheduled interviews but did not seek out any new participants.

Table 3.1: Semi-structured interview participants

Participants	No. of Interviews
Fishers	27
Harbour supervisors	4
Local DFO reps	3
Fish buyers	2
Total	**36**

To ensure participants were treated fairly, each person was informed of the general nature of the research project when they were first contacted. During the interview more information was provided regarding the details of the research project. Verbal consent was sought before the voice recording device was turned on. Two of the 36 people interviewed requested the interview not be recorded. Confidentiality was maintained by asking each participant whether they preferred to be identified or remain anonymous in any quotations used throughout this thesis. All except one participant preferred to be identified, possibly out of a sense of pride or a desire to be attributed with their thoughts and opinions. As such, most quotations throughout this thesis are attributed to a particular participant except for cases where an individual preferred to remain anonymous or where sensitive information was provided.

3.5 Photovoice

Photovoice, often referred to as participatory photography or participant-employed photography, elicits responses to a series of questions by asking participants to take photos of physical locations that either literally or symbolically represent their ideas. Photovoice has been used to engage populations that may not be receptive to traditional interviewing methods, and to provide a 'safe space' for emotional reflection (Carlson et al. 2006). The method was developed

for use in environmental health research and has since been expanded to include multiple other disciplines (Wang & Burris1997). Photovoice is particularly relevant for place-based research due to its capacity to enhance a participants' ability to communicate abstract concepts rather than relying on verbal description alone. Wang and Burris (1997: p.370) describe the three goals of photovoice as: "1) to enable people to record and reflect their community's strengths and concerns; 2) to promote critical dialogue and knowledge about important community issues through large and small group discussion of photographs; and 3) to reach policy makers."

Sherren et al. (2012) provide a relevant example of photovoice (or photo elicitation as they refer to it) to research how farmers' value land and what this may suggest for wetland restoration and climate change adaptation in Cumberland County, Nova Scotia. Researchers gave disposable cameras to 27 farmers asking them to take photos of "features of their landscape that were significant to them" (p. 67). They interviewed each participant asking why each photo was taken, subsequently categorizing interview and photo content by theme. The research revealed that farmers highly valued wetlands for their ability to filter water but did not necessarily recognize their use as an adaptive strategy for climate change impacts (Sherren et al. 2012). My research project uses photovoice in a similar way to engage youth in conversations about their connections to places in their community. As in the Sherren et al. study photovoice proved an effective method for engaging in otherwise difficult conversation; either because of the abstract nature of the topic or due to a demographic that can be difficult to engage in standard interviews.

3.5.1   Youth Perspective

Outmigration is a major social challenge facing rural communities throughout Canada, particularly those in the Maritime Provinces (Hamilton & Butler 2001). As education and employment opportunities in the cities and Western provinces become increasingly accessible, larger percentages of young people are opting to move away from their hometowns. Between 2006 and 2011 the rural population of Nova Scotia decreased by 2%, with a total of more than 6000 residents leaving rural areas (Statistics Canada 2011a). An inability to attract and retain young people remains an ongoing challenge for rural communities throughout Atlantic Canada (Power 2013). Many interview participants described extremely high start up costs combined with low initial return rates as a deterrent for youth looking to start fishing careers. Although youth outmigration from rural communities poses a threat to community viability, it also

indicates increasing opportunities for formal education among rural youth (Corbett 2007). According to interview participants, many youth are moving to Alberta in search of higher paying jobs in the oil and gas industry. Higher levels of education and increased affordability of air travel are changing the age demographics of rural communities. Therefore, it is important to consider multigenerational perspectives when assessing future challenges to the fishery. In order to accomplish this, my research project included youth participants through the photovoice method.

3.5.2 Photovoice Sampling Method

In order to recruit participants in a non-coercive manner, I used a poster detailing the requirements for participation, the nature of the research project, and offering participants free pizza as an incentive to participate (see Appendix C). Posters were displayed in public buildings such as the post office and local businesses in the towns of Shelburne and Lockeport. This method proved ineffective as only one participant contacted me as a result of the posters. In retrospect, requiring potential participants to read posters and initiate contact with me without any personal communication was not the most effective way to reach members of the target age group. A second effort to find participants relied on word of mouth from contacts in the community. This method is a non-randomized form of convenience sampling useful for contacting difficult-to-reach members of a community (Bryman et al. 2012). Local community members distributed the poster via social media and provided contact information to potential participants. In rural settings, word of mouth is often more effective than posters, which proved to be the case in this situation. As a result this sample was by no means randomly selected. However, in a small town with a high degree of social connection, convenience sampling was considered the most effective recruitment tool. The goal of the photovoice project was to provide additional perspectives to supplement interviews with people involved in the fishery. In total, five participants agreed to join the study of which four completed all four stages of the project and one additional participant joined only the focus group stage.

3.5.2.1 Stage 1 Photography Workshop

I lead a photography workshop for the five initially interested participants in order to introduce basic photography skills. The workshop was held at the local library and concepts such as composition, aperture, shutter speed, and depth of field were presented. Disposable cameras

were made available but all participants had personal smart phones (with the exception of one participant who had a digital SLR camera). The purpose of the workshop was to provide capacity building skills in a region where few opportunities of this sort exist, particularly during the summer months when school is not in session. Participants were informed they could use the project as a means to practice skills learned in the workshop, but that the quality of the photos they took for the photovoice project was less important than the content.

3.5.2.2 Stage 2 Photo Challenge

Participants who attended the photography workshop were given the opportunity, but not required, to participate in the photovoice project. Participants were asked to take three photos of places that were important to them in their communities and three photos of places where they would like to see change. I explained photos of important places might include places that are fun, that have history, that are symbolic, that are important to your family, that you find particularly beautiful, places where you feel comfortable, or where you can be yourself, they can be large or small places. Photos of places where they would like to see change were explained as places where there has been changes you do not like, places that you think could be improved, places that used to be important but are gone, or that never existed but you wish were there. I distributed a piece of paper describing the two types of photos along with written directions (see Appendix D). Those who wished to participate were asked to email me their six photos within a week.

3.5.2.3 Stage 3 Individual Interviews

Although some extensions were granted, each participant's photos were eventually received with the exception of one participant who dropped out of the study at this point. Photos were printed in an 8x10 inch format by a local photo printing business. Each participant set up a date and time that was convenient for him or her to meet with me either at their home or at a local coffee shop. During the individual interviews participants were asked to first categorize their photos, separating photos of places that were important from those of places where they would like to see change. Participants were then asked to explain the content of each photo and their reason for taking it. Each interview began with a conversation about the photos of important places and ended with the photos of places they would like to see change in order to naturally ease into what was assumed to be the more difficult conversation.

Lastly, participants came together to view each other's photos and engage in a group discussion. At this stage of the project one participant was unable to attend the focus group and an additional participant, a friend of another, joined the conversation. Although no photos were taken by this fifth participant, an additional perspective was useful during the discussion. The printed 8x10 inch photos were displayed on the walls for all to view. Each participant briefly explained their photos to the rest of the group and others had an opportunity to ask the photographer questions. Next, participants used three different coloured sticky notes to identify why photos were important. Different colours indicated places important for talking to friends, important for making money (either for them or their families), or important because they are beautiful. All participants used sticky notes to identify the importance represented in all photos, not just their own. Differentiating the photos in this way drew out factors such as social importance, economic importance, and aesthetic beauty—all sub-dimensions of sense of place— to guide the discussion. Allowing participants to reflect on other's photos also provided an opportunity to consider the importance of places they had not previously thought to take photos of.

In order to ensure a non-coercive recruitment process participants were required to contact me via email or phone after seeing the recruitment poster or hearing about the project through word of mouth rather than asking individuals to agree on the spot to participate. All participants under the age of 16 were required to have parental consent, as per University of Waterloo ethics guidelines. In order to protect the identity of what is considered a vulnerable population (youth under 18) all quotations from photovoice participants remain anonymous throughout this thesis. The photos each participant took remain their property of which they retain all creative rights. However, each participant was asked to sign a photo release form granting me permission to reproduce his or her work.

3.6 Data Analysis

Throughout the data collection process I reviewed my handwritten point form notes from each interview and continually added to a preliminary list of initial conversation topics, or codes, that were arising from the interviews. Each topic on the list was categorized as either social, economic, ecological, political (a category that was eventually dropped due to lack of relevance), sense of place, adaptive capacity or 'other' category. Many topics were added to more than one

of these categories. This preliminary coding provided the basis for more thorough coding later in the analysis process.

After I finished data collection I transcribed all interviews, including the photovoice interviews, verbatim using computer based audio playback software and a word processing document. Repeated words, stammering and excessive 'umms' and 'ahhs' were excluded from transcription. However, specific effort was taken to retain the idiosyncrasies of the speaker in the text. I typed up the handwritten notes I took for those participants who asked to not be voice recorded. While transcribing I continued to add to the list of preliminary codes and indicated after each paragraph of speech the main keywords addressed in the paragraph in order to facilitate coding later on. I uploaded the interview transcripts into Nvivo version 10.1.2. Nvivo is a research analysis software that aids in the collection, organization and analysis of qualitative research data (QSR International). I gave each code identified in the preliminary list its own 'node' in Nvivo.

In the second round of coding I combined nodes that were similar and separated nodes that contained more than one distinct idea. For example 'lack of young fishers' and 'increasing average age' were amalgamated into the code 'aging fleet'. After this stage I had four general categories: Biophysical change, socio-economic change, sense of place and adaptive capacity. Each of these was further broken down into sub-categories as indicated in the coding structure presented in Appendix F.

A third round of coding involved reading through the transcripts again and re-applying the new codes developed in the second stage of coding. Next, I focused specifically on the codes for socio-economic attributes of adaptive capacity. I highlighted coded text that indicated either a positive or negative relationship with an element of sense of place. For example, if some talked about working on a friend's swordfish boat during the offseason for lobster, I indicated a positive link between 'income diversification' and 'social connections'. The complete results of this analysis are indicated in Figure 6.6.

When analyzing the photovoice interviews I looked at the photos taken by a particular participant as a visual guide for understanding the interview. Analysis for this part of my research project focused on experiences of change and expressions of sense of place. Participants were at a stage of life where their 'flexibility', 'assets', 'learning' and 'social organization' were relatively limited considering three out of four participants still attended high school. This meant

that in order to include a youth perspective on sense of place and adaptive capacity I had to code these interviews differently than those with adult fishers, business owners and DFO personnel. Thus, coding for these interviews was limited to connecting how sense of place influenced how youth talk about the future. For example, if a participant mentioned wanting to remain in or return to his or her hometown in the future due to a feeling of being safe there, I would code this as a positive connection between 'security' and 'outmigration'. These connections as well as their accompanying photos are discussed in Section 6.2.

3.7   Opportunities and Challenges

Prior to conducting interviews some challenges arose when attempting to contact participants. The lobster season in the study site runs from the last Monday in November until May 31st. Research began during the second week of May, thus making it difficult to schedule interviews with lobster fishers during the first 2-3 weeks of the study. Challenges also arose when attempting to contact potential participants through phone calls. Initial calls were made from a long distance number resulting in unanswered calls and unreturned messages until a local phone number was activated.

During interviews the presence of a recording device and the physical location of the interview can affect participants' level of ease and candour (Rubin & Rubin1995). Of the 36 interviews only two participants chose to not be recorded. However, multiple participants asked for the recorder to be turned off during sections of the interview dealing with sensitive topics. Most interviews were conducted in the participants' homes, with 12 out of 36 interviews conducted at businesses, coffee shops, or at the wharf.

My own life experiences, social norms, academic focus, and understanding of the issues inevitably determined what I heard, how I interpreted the data, and how I have reported the information in this thesis. Factors such as social norms, gender, and power dynamics impact self-expression of both the participant and the interviewer throughout various stages of research (Wiles et al. 2005). Moreover, my own sense of place influences the way I "see, research and write" about others sense of place (Cresswell 2004 p. 15). In order to provide transparency this section outlines my demographics, place influences and experiences that are consequently reflected in this research project.

Within the study site the first four characteristics most people would notice about me are that I am a young, non-local, female with a university education. The average participant was an older male with little formal education who has lived in the study site his entire life. Consequently, social norms and beliefs regarding institutionalized education, gender roles, and age hierarchies may have affected the types of questions asked, participants' responses, and data interpretation. Female researchers in male-dominated industries have been shown to experience gender-related challenges and benefits (Gurney 1985). Gurney's study on how gender affects the ability of a female researcher to gain access to, establish and maintain rapport in a male-dominated research context highlights instances of sexism ranging from sexual propositioning to seeing the female researcher in an inferior role due to gender. She explains experiences such as these are common to many female researchers interviewing male participants. In my experience sexist treatment from some participants included assumptions of naivety, over simplified explanations, and paternalistic, protective behaviour. However, it is difficult to differentiate which of these experiences can be directly attributed to gender differences and which are due to being considered an outsider of the fishing industry. While differential treatment based on gender made it difficult to establish professional rapport with some participants, as with Gurney (1985) I found a benefit to being a female researcher was being perceived as non-threatening and uncompetitive. This enabled conversations to become deeply personal with participants often sharing emotional details on topics such as financial stress, death of loved ones, and future uncertainty. Likely different challenges and opportunities would be present for male researchers in this context.

Although I was considered to be 'from away', which I generally took to mean not from Atlantic Canada, I found I was able to connect with many participants by talking about my grandparents' farm in Alberta. This conversation starter seemed to provide some common ground from which to begin a conversation about changes and challenges in the primary industry sector and the similarities and differences between fishing and farming. My choice to pursue post secondary education was also different from most of my participants, the majority of who entered the work force directly after high school. In recognition of these differences I started conversations by focusing first on our similarities. For example, conversations about what was happening in local and national news, asking questions about features of their homes I admired,

and talking about my experience living in their community helped develop trust between us and establish a congenial interview environment.

3.8 Chapter Summary

A qualitative case study-based approach guides this research on the relationship between sense of place and adaptive capacity. Data collection methods include participant observation, semi-structured interviews, and photovoice. I utilized a hybrid grounded theory approach where themes were allowed to emerge iteratively from the data while employing an a priori framework for how to understand and identify connections between sense of place and adaptive capacity. This methodology elicited in-depth accounts of social, economic, and ecological vulnerabilities as well as connections between sense of place and adaptive capacity among the interview participants. While the results of this research cannot be applied beyond the scope of this project, they provide a robust case study analysis that can inform other research in this field. Analyses of particular themes, concepts, events and examples that emerged in the data have allowed me to identify key issues in relation to my research objectives. Acquiring a local phone number and intentionally focusing on similarities between participants and myself helped overcome research limitations such as difficulty contacting participants and being viewed as an outsider in the community. Results of the study are presented in Chapters 5 and 6, following an overview of the case study context in the next chapter.

Chapter 4:   Case Study Context

"I'm steeped in the fishery on my father's side and on my

mother's side both!"

~Lemuel (Lemmie) Locke, Sandy Point

4.1   Physical Setting

Nova Scotia is the second smallest province in Canada and one of three provinces in the Maritime Region, along with New Brunswick and Prince Edward Island. When Newfoundland is added to this list, the region is known collectively as Atlantic Canada. Nova Scotia is a peninsula connected to the rest of Canada by the 24 km wide Chignecto Isthmus. As such, Nova Scotia is a truly coastal province, with a total of 13, 300 km of coastline and no point on land further than 67 km from the coast (Province of Nova Scotia 2009a). Four distinct bodies of water surround Nova Scotia: the Northumberland Strait to the North, Gulf of St. Lawrence to the Northeast, Bay of Fundy to the Northwest and the Atlantic Ocean to the South (Figure 4.1). As stated in a draft of the Nova Scotia Coastal Strategy (the only version of this document that has been released as of March 2015), the economic, social and cultural benefits Nova Scotians derive from the coast make it one of the Provinces most highly valued features (Province of Nova Scotia 2011). As a result of its proximity to the sea, Nova Scotia's weather is highly variable and vulnerable to extreme events such as hurricanes and blizzards. The most recent notable examples include Hurricane Juan (September 2003), White Juan blizzard (February 2004), Hurricane Bill (August 2009), Hurricane Sandy (October 2012) and Hurricane Arthur (July 2014). The typical season for tropical weather in Atlantic Canada runs from June-November (Forbes et al. 2007).

Figure 4.1: Bodies of water surrounding Nova Scotia. (Image from www.nationalencyclopedia.com).

The study site for this research stretches from the community of Port Clyde in the west to Port Medway in the east, and is located along the South Shore region Shelburne and Queens Counties (Figure 4.2). The three largest communities are Liverpool (population 2,653), the Town of Shelburne (population 1,686), and the Town of Lockport (population 588) (Statistics Canada 2011a). Shelburne County contains five municipalities, while Queens County formerly had two but amalgamated in 1996 to form the singular Region of Queens Municipality. In total there are four municipal units within the study site: the Municipality of the District of Shelburne, the Town of Shelburne, the Town of Lockeport and part of the Region of Queens Municipality.

The ParCA program in coordination with local community partners chose Queens and Shelburne counties for the study site. The area meets ParCA requirements of a North American site with active fisheries and tourism sectors. Moreover, regions east (Lunenburg County) and west (Yarmouth County) of the study site have been extensively studied leaving ample room for research to benefit the communities in the chosen area. Connections established within the study site through community partners such as the Ecology Action Centre, an environmental not-for-

profit based out of Halifax, and various municipal council members, provided further reason to establish the site boundaries.
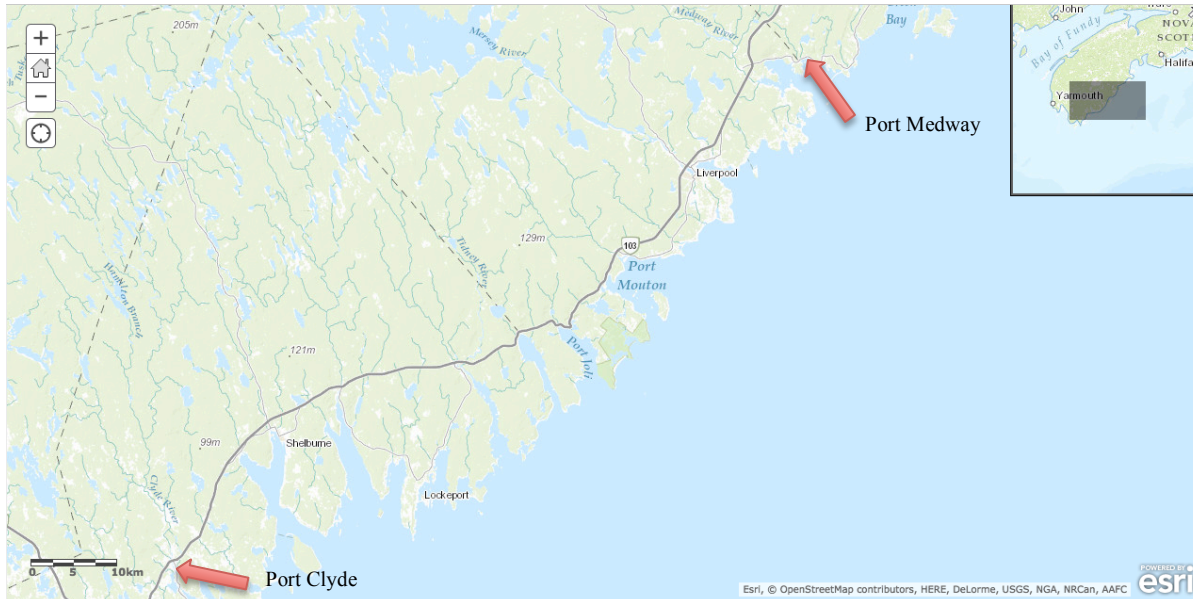
Figure 4.2: Nova Scotia study site boundaries. (Image from Google Maps).

The South Shore provides easy access to the species-rich and shallow offshore banks valuable to the fishing industry. The most important of these fishing grounds for South Shore fishers are George's Bank, Roseway Bank, Brown's Bank, Baccaro Bank, and La Have Bank. These banks host populations of commercially valuable species such as groundfish, swordfish, and tuna. As a result of its proximity to abundant fishing grounds, the South Shore historically depended primarily on groundfishing and maintained a reputation as a lucrative fishing region until the decline in the groundfishery in the early 1990's. Some of the most lucrative fishing harbours along the South Shore are on Cape Sable Island, located to the west of the study site.

The region is physically vulnerable to climate change due to its exposure to flooding due to sea level rise and storm events, species migration due to ocean temperature increases, ocean acidification and loss of sea ice (Nye 2010). Additional challenges such as outmigration, an aging population, high start up costs to enter the fishery and strict groundfish quotas make these communities increasingly sensitive to climate change impacts. Climate change adds a layer of unpredictability to already complex social and ecological interactions within the South Shore fishery. This chapter outlines the physical exposures and social sensitivities that contribute to climate change vulnerability in the study site.

4.2   Historic Setting

The Mi'kmaq and Malicite people have inhabited the land and islands known today as the Maritime Provinces for several thousand years (Halifax Public Libraries n.d.). Their traditional territory extended throughout Nova Scotia, New Brunskwick, PEI and the Gaspé peninsula of what is today Québec. Historically, aboriginal peoples relied heavily on hunting and fishing and thus settled primarily near the coastline. However, First Nations participation in the commercial fishery in Atlantic Canada has remained contentious for many decades. Notably, in 1999, First Nation treaty rights were recognized in the Supreme Court case R. v. Marshall where Donald Marshall Jr., a Membertou First Nations man in Cape Breton was charged with fishing eel without a license. He cited the eighteenth century Peace and Friendship Treaty as giving him aboriginal treaty rights to sell fish commercially even though at the time First Nations people were only given special rights to fish for food and ceremonial purposes (March 2002). The case passed in the Supreme Court of Canada giving treaty rights to First Nations throughout Atlantic Canada to commercially sell fish without being subject to the regulations that apply to non-aboriginal fishers. This landmark event became known as the Marshall Decision, which has been a defining moment in the history of the Atlantic Canadian aboriginal and non-aboriginal fishery.

In 1604, French explorers such as Samuel de Champlain arrived in Nova Scotia. They began to build Acadian establishments in Port Royal (now Annapolis Royal) and the Fortress of Louisbourg before spreading throughout the Maritimes. Along with First Nations groups, the Acadians also engaged in hunting and fishing as well as fur trading with the Mi'kmaq people. In 1713 the Treaty of Utrecht ended the War of Spanish Succession and made the Acadians British subjects. Acadians were subsequently deported from their land in 1758 after refusing to fight for the British against the French and Mi'kmaq in what is known as "*Le Grande Dérangement*" or the Great Expulsion (Parks Canada, personal communication). In the 1760's many Acadians slowly began to return and resettle in the Maritimes, but many remained dispersed (Canadian Broadcasting Company 2015). Acadians remain a strong cultural force throughout the Maritimes today and there are many French speaking Acadian towns throughout the region. The areas of East and West Pubnico and the Acadian Shore are Acadian regions nearest the study site. East Pubnico continues to be particularly important to the fishing industry, housing Dennis Point Wharf, the largest commercial port in Atlantic Canada. Fishing and coastal access have played a large role in the history, settlement, and culture of the Maritimes.

4.3 Socio-economic Setting

The study site is comprised of multiple small, rural coastal communities. While many communities are close in proximity to one another, clear boundaries and identities exist within each community. Although geographically the entire study site is part of the South Shore region, there are two distinct associations within the site. Residents of Shelburne County tend to associate themselves as part of South West Nova, an unofficially defined region that stretches approximately from Lockeport around the bottom of the province to Digby while residents of Queen's County associate more with being from the South Shore which includes Mahone Bay and Lunenburg (J. Graham, pers. comm., July 25 2012).

Although the population of Nova Scotia as a whole increased by 1.7% between 2006-2011, the population of all municipalities in the study site decreased drastically. The population of the Municipality of the District of Shelburne decreased by 8.7%, the Town of Shelburne by 10.3%, the Town of Lockeport by 9% and the Region of Queens Municipality by 2.3% (Statistics Canada 2011a). As a result, the average age of residents among all municipal units is higher than average at 51.1 years compared to 43.7 years of age nationally (Statistics Canada 2011a). As of September 2014 the unemployment rate for Nova Scotia sits at 8.6% (Statistics Canada 2015). While this is the lowest rate in Atlantic Canada it remains 1.8% higher than the national average.

The fishing, hunting and trapping sector represent a mainstay of the provincial economy. Ocean sector employment alone directly provides 6.8% of jobs and 8.1% of total GDP in Nova Scotia (Gardner et al. 2009). When indirect benefits are included the entire ocean sector provides 13.9% of jobs and 15.5% of GDP in the Province (Gardner et al. 2009). However, these numbers are presumably much higher in rural areas. Direct benefits to the ocean sector economy include all forms of fishing. Indirect examples include marine tourism, boat building, fish processing, off shore oil and gas and water transportation. In 2013 the total landed value of all commercial seafisheries in Nova Scotia was $845 million, of which 49% is from lobster landings alone (DFO 2014a).

Fishing harbours provide coastal access for boating and recreational activities, harbour front development such as walkways, harbour festivals and increased interaction among First Nations and non-aboriginal residents (CCN 2004). Fisheries and fishing harbours help establish a sense of pride and identity, contributing to overall sense of place in coastal communities (CCN 2004). Currently, privatization of coastal land and foreign land ownership pose challenges to

maintaining coastal access and the plenitude of socio-cultural benefits the coast provides. As the State of the Coast report indicates, 86% of Nova Scotia's coast is privately owned and currently there are no universal access laws in place to protect public coastal access (Province of Nova Scotia 2009a).

4.3.1 Drivers of Socio-Economic Change

Until the late 1980's the Atlantic groundfishery was highly profitable consisting of independently owned longline vessels, and small draggers targeting groundfish species such as cod, haddock, pollock, halibut, and hake. This was a 12 month fishery providing year round employment for fishers. However, today Canadian fisheries are known globally as a case study in poor management with the collapse of the commercial cod fishery off the Grand Banks of Newfoundland being the prime example (Finlayson and McCay 2000). As described in Section 1.4, a combination of political mismanagement, lack of quota enforcement, and illegal fishing, resulted in a federal moratorium on groundfish landings off the Grand Banks of Newfoundland in 1992. Although the moratorium was specific to the area near Newfoundland, groundfish stocks throughout Atlantic Canada were also in severe decline. As groundfish quotas decreased and enforcement tightened many individuals across the Atlantic region chose to leave the groundfishing sector entirely. Various alternatives included investing in other fisheries, going back to school, and joining the migrant workforce in Western Canada (Hamilton and Butler 2001). However, limited income options and increased migration weakened the ability of the Atlantic fishery to respond to change (Wilson-Forsberg 2013). High levels of outmigration and unemployment remain a problem for rural Nova Scotia communities. Of those who remain in the Nova Scotia groundfishery, few are able to make a living on their small allocations alone. Most need to lease quota from someone else to make fishing trips profitable, thus significantly decreasing the amount of profit per pound of fish. Most groundfishers also diversify their income throughout the year with other fisheries such as lobster, herring, eel, swordfish, marine plants such as Irish Moss and Rockweed, and mollusc fisheries. However, it is expected that decreasing fish quotas and the illegal yet common practice of combining licences will result in future decreased employment in the Nova Scotia commercial fishing industry (Gardner et al. 2009). The State of the Coast report indicates coastal communities in Nova Scotia are already in the

process of transitioning from a healthy to declining state at an alarming rate, indicating the importance of maintaining well-managed, sustainable fisheries (Province of Nova Scotia 2009a).

The recent One Nova Scotia Commission report (also known as the Now or Never Report) released by the Nova Scotia Coalition on Building Our New Economy (2014) recognizes the challenges Nova Scotia is facing, particularly in terms of an aging and shrinking population. The coalition is chaired by Ray Ivany, the president of Acadia University as part of a diverse five-person panel of commissioners. The report identifies the need for a shared vision throughout all industries, regions and politics in the Province, outlining nineteen specific goals related to population retention economic development and governance. Examples of these goals include "tripl[ing] the average number of new [international] permanent residents annually to 7,000" (p. 48) and "doubling the value of products produced and consumed in Nova Scotia" (p. 49). The sense of urgency communicated in the report sparked public attention and has received significant media attention and endorsement throughout the Province.

4.4 Fisheries Governance

Fisheries throughout the world are a difficult industry to govern. Commons theory posits that rational individuals will seek to maximize their gains from common pool resources, making sustainable harvesting difficult to achieve without strict regulations (Hardin 1968). Marine fisheries are also difficult to regulate due to the vastness of the ocean and the fact that fish are not stationary meaning they don't fall within international government boundaries. Despite these governance difficulties, Ostrom (2009) has pointed out the ultimate tragedy of the commons scenario (resource depletion) is not inevitable, but rather some resource user groups have been able to cooperate to achieve resource sustainability. This theory confronts Hardin's proposition that individuals are ultimately self-interested. These findings are encouraging because they suggest fisheries can be successfully and sustainably managed given the right circumstances. Fisheries have no one-size-fits-all governance solutions. This section outlines some of the primary forms of governance utilized in the Nova Scotia fishery.

In Canada, international, national, provincial and community-level governance organizations regulate commercial fisheries in different capacities depending on species, gear type, and distance from shore. The international North Atlantic Fisheries Organization (NAFO) regulates fishing in international waters outside the 200-mile economic exclusion zone (EEZ)

which extends off the coast. NAFO regulations apply to all marine species outside this 200-mile limit with the exception of salmon, tuna, marlin, cetaceans, and sedentary species (such as lobster, crab and clams). Previously, the International Convention on North Atlantic Fisheries (ICNAF), which became NAFO after the establishment of the 200-mile EEZ in the late 1970's, played a larger role in regulating all groundfishing operations (Halliday & Pinhorn 1996). ICNAF divided the North Atlantic into different fishing designations (Figure 4.3). Most groundfishing licenses in the study site are allocated for fishing area 4X.
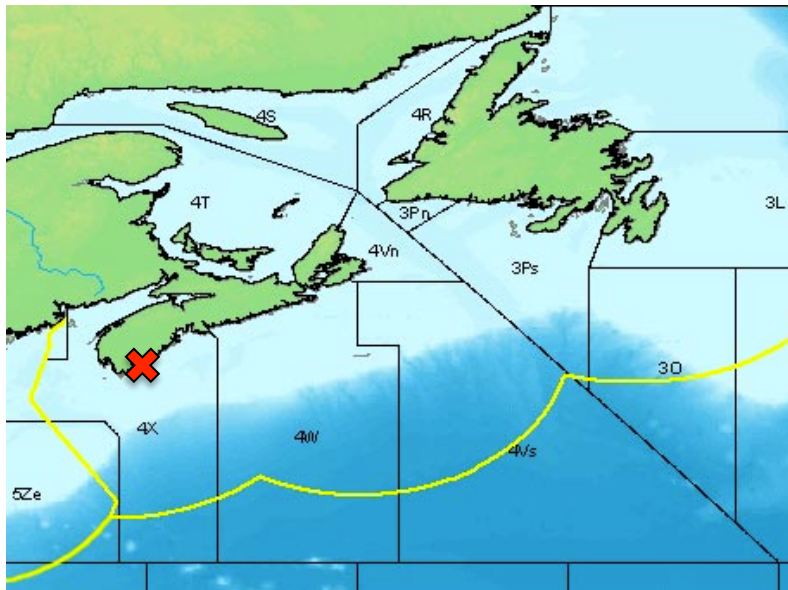
Figure 4.3: NAFO groundfishing designation areas. The yellow line follows the 200-mile limit. NAFO has jurisdiction outside this line and DFO has jurisdiction inside the line (within Canada). The X indicates the study site bordering area 4X. (Image from http://www.nafo.int/fisheries/frames/fishery.html).

In Canada, the federal Department of Fisheries and Oceans (DFO) regulate commercial fisheries and aquaculture operations within the 200-mile EEZ through the Fisheries Act. Both inshore and offshore fisheries within this area are under DFO jurisdiction. Management responsibilities include setting quota limits, developing conservation strategies, enforcing catch limits and patrolling illegal fishing. The DFO is divided into six administrative regions across Canada, overseen by the federally appointed Minister of Fisheries and Oceans. Both the Gulf and Maritimes regional branches have jurisdiction in Nova Scotia. The South Shore is included in the Maritimes Region, which extends from the northern tip of Cape Breton to the New Brunswick-Maine border and is headquartered in Dartmouth, NS. In addition to fisheries management the

Small Craft Harbours branch of DFO helps manage core harbours by providing funding and support to community operated Harbour Authorities.

At the provincial level, the Nova Scotia Department of Fisheries and Aquaculture (DFA) is responsible for managing and regulating aquaculture operations, inland fisheries, habitat rehabilitation, fish processor and buyer licensing, and a provincially operated loan board that provides funding for qualified fishers (Province of Nova Scotia 2013). While the federal government manages the sustainability of aquaculture operations through the Fisheries Act, the province is responsible for managing and regulating leasing and licensing (DFO 2015). The Province has no jurisdiction over commercial fisheries or the operation of active harbours. Local level organizations such as community management boards, fishing associations and Harbour Authorities also play important governance decision-making roles at a local level.

The following paragraphs outline relevant governance systems and regulations for the Nova Scotia groundfish and lobster fisheries in order to provide context for how these fisheries function within the Province. Although many fishers in the study site participate in fisheries other than groundfish or lobster, these represent the two fisheries that employ the most people and are the most economically important throughout Atlantic Canada.

4.4.1 Groundfishery Management

Due to the declining commercial groundfishery, DFO began using an individual transferable quota (ITQ) system in the early 1990's in an attempt to allow self-regulation of the groundfishing effort. ITQs are allocated as a percentage of a Total Allowable Catch (TAC). The DFO allocates TACs based on species type, gear type or vessel size and ITQs represent a portion of the overall TAC allocated to individuals. Individuals can decide to either fish their allotted quota or sell all or part of it to someone else. Generally this decision is based on profit margins. In this way ITQs are like a cap-and-trade system with market fluctuations determining where quota accumulates. A common criticism of this approach is that ITQs allow market forces to reduce fishing capacity by creating a monopoly of quota in the hands of a few (Copes & Charles 2004). This causes reduced employment and unequal distribution of decision-making power in the fishery. In some systems individual quotas can be non-transferable meaning that they can not be bought or sold and each fisher's share remains constant from year to year (Copes & Charles

2004). Some parts of the Nova Scotia fishery use this method but it is far less common than the ITQ system.

The ITQ system was not received well by fishers in the small-boat inshore fishery, as many felt disproportionately impacted by DFO quota distribution (Copes & Charles 2004). In 1995-96, fishers throughout the Maritimes participated in a series of protests blockading ports and marching in Halifax demanding more influence in management and quota distribution (DFO 2007). Protests culminated in February 1996 when a small group of fishermen occupied a DFO office near Yarmouth in protest of decreasing quotas for inshore handliners, while offshore groundfish trawlers and international fishing vessels went largely unregulated (Forbes & Forbes 2004). These protests along with comments and suggestions from the industry encouraged DFO's adoption of a community-based allocation process for the inshore longline (also known as hook and line), gillnet and handline fisheries (Charles 2006; DFO 2007). Under this system DFO allocates TACs to a particular geographic region rather than to a specific fleet based on gear type or vessel size (Charles 2006). Fishers in each region form a community management board and collectively divide the community allocation among different 'gear sectors', developing a management plan using their own rules and enforcement measures to allocate individual quotas (DFO 2007). Although this change was industry driven it did not result in a seamless transition. For example, in Shelburne County, two community management boards formed in the same region as a result of irreconcilable differences between fishers who historically fished their licenses and those who held licenses but had not been fishing them. The total allowable catch allocated to each region was based on the combined historic catch value for each individual fisher in that region. Perhaps unjustly, those who contributed little to no catch could benefit by receiving a percentage of the community allotment disproportional to what they had contributed. Additionally, those who did not participate heavily in the fishery had more time to contribute to managing the community management boards, resulting in power struggles. Fishers in Shelburne County who had contributed most to the community allotment decided to form a separate management board in order to better represent their own interests. Differences in terms of who had the "right" to fish the community allocation caused much conflict, often dividing communities (Fisher 20, pers. comm. June 11, 2013).

4.4.2 Lobster Fishery Management

Atlantic Canada is divided into different lobster fishing areas (LFAs) as depicted in Figure 4.4, with the study site belonging to LFA 33. While most lobster fishing happens inshore, a single offshore lobster allocation exists in LFA 41. Clearwater Seafoods owns exclusive rights to all offshore licenses in this area. Currently DFO manages the inshore lobster fishery using biophysical controls rather than an ITQ system. Industry-wide controls include returning all egg-bearing females to the sea, mandatory escape hatches in traps allowing small lobsters to escape, and regulated licensing. Furthermore, each LFA has specific carapace (body) size restrictions, trap limits and seasons. In LFA 33 the legal carapace size is 82.5mm, traps are limited to 250 per license (with the option to add 125 traps with the purchase of a second license, known as 'doubling up), and the season extends from the last Monday in November until May 31st (DFO 2004). In light of recent lobster catch abundance there has been some talk of moving to an ITQ system. Critics of ITQs however point out that this move would be detrimental to the viability of individually owned fishing operations and livelihoods as transferable quotas almost always lead to corporate control of the industry (Charles 2013).

During the spring of 2013, lobster fishers throughout the maritime provinces tied up their boats to protest low prices offered by buyers. Through this act, they attracted media attention and eventually initiated a multi-province review of the state of the lobster fishery in the Maritime Provinces. The results of this review are presented in the Report of the Maritime Lobster Panel (Thériault et al. 2013). Throughout the interviews conducted for this research project many lobster fishers mentioned feeling they do not have a voice when it comes to fisheries policy. Self-organized sporadic protests in both lobster and groundfisheries seem to emerge in desperation as a response to not being heard by higher level governing bodies.
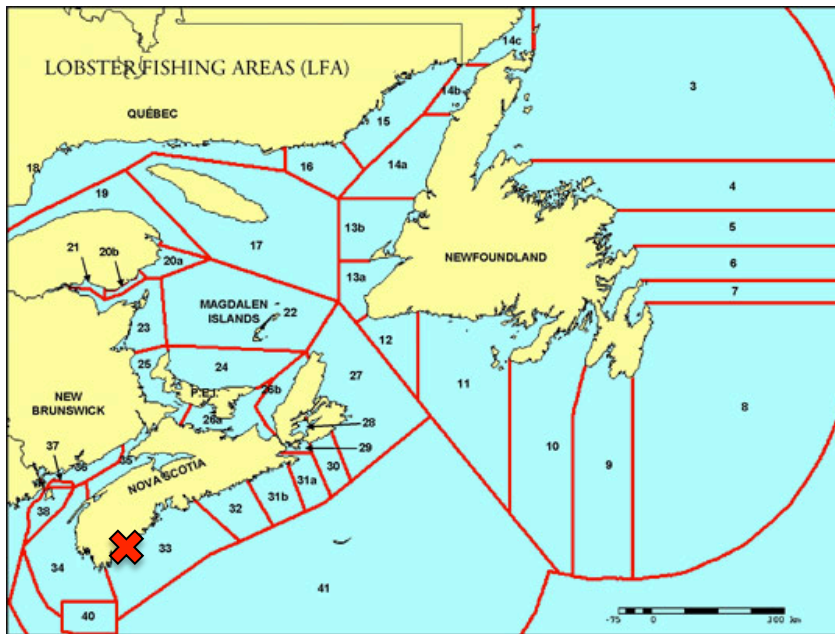
Figure 4.4: Lobster fishing area designation in Atlantic Canada. The circle indicates LFA 33, the study site runs along the coast of this designation. (Image from dfo-mpo.gc.ca).

4.4.3 Harbour Management

Beginning in 1987 management of non-essential fishing harbours changed hands from the Department of Fisheries and Oceans—Small Craft Harbours Branch (DFO-SCH) to fisher-operated Harbour Authorities (CCN 2004). Currently there are 162 fishing harbours managed by local Harbour Authorities in Nova Scotia (DFO 2014b). DFO-SCH retains ownership of the harbour but fishers are given the option to form a federally incorporated not-for-profit organization called a Harbour Authority. Harbour Authorities lease the harbour from DFO-SCH and manage day-to-day operations including paying for lighting, garbage removal and small maintenance projects, as well as apply to DFO-SCH for large project funding. Harbour Authorities are comprised of a voluntary board of directors responsible for supervision, and voluntary officers responsible for the day-to-day operations, although there is often very little distinction between these two roles due to the same volunteers fulfilling both positions (DFO 2011b). The divestiture program aimed to give industry control over their harbours while allowing the DFO to focus organizational and monetary resources on harbours they consider to be 'essential to the fishing industry', known as 'core harbours' (DFO 2008).

While many harbours benefited from divestiture by receiving project funding and a sense of ownership over wharf operations, others struggle due to an inability to maintain a functional Harbour Authority (Province of Nova Scotia 2009a). As mentioned above, rural coastal

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populations are declining and fewer young people are getting involved in the fishery resulting in a lack of volunteers to fill necessary Harbour Authority positions. As a result, volunteer burnout and conflict among users are common problems (CCN 2004). Additionally, it is difficult to find new Harbour Officers given the lack of young fishers entering the industry and the largely unappealing nature of the job (CCN 2004). Although DFO-SCH recognizes the economic and social importance of maintaining harbours and wharves as public resources (CCN 2004), an inability to financially support all wharves in Nova Scotia has forced the department to make trade-offs. Governance decisions surrounding harbour management is thus fraught with tension, frustration, and concern, particularly regarding the viability of harbours with the fewest users.

4.5 Regional Evidence of Climate Change

4.5.1 Sea Level Rise and Storm Events

Sea level rise poses a significant threat to Nova Scotia due to the Province's extensive exposed coastline and economic and social dependence on the ocean. Important economic activities affected by storm events include fishing, tourism and shipping (Forbes et al. 2007). According to the IPCC's 5th assessment report sea levels rose 0.17-0.21m globally between 1901-2010 and the rate of sea level rise from 1993-2010 was nearly double that of the previous century (Church et al. 2014). More specifically, a study commissioned by Nova Scotia Environment projects sea levels to rise by 1.06m between 2000 and 2100 (see Figure 4.1) (Richards & Daigle 2011). The effects of sea level rise in Nova Scotia and surrounding maritimes areas is exacerbated by a phenomenon known as land subsidence, or vertical adjustments of the earth's crust in response to the last ice age. Subsidence occurs throughout Nova Scotia, although not uniformly. According to a study by the Bedford Institute of Oceanography, land subsidence in some areas of Nova Scotia can be up to 20 mm/yr (Forbes et al. 2007).

Table 4.1: Sea level rise projections for Liverpool, NS.

Extreme Total Sea Level (metres CD) – Liverpool						
Return Period	Residual	Level 2000	Level 2025	Level 2055	Level 2085	Level 2100
10-Year	0.71 ± 0.20	3.01 ± 0.20	3.16 ± 0.23	3.44 ± 0.35	3.84 ± 0.56	4.07 ± 0.68
25-Year	0.81 ± 0.20	3.11 ± 0.20	3.26 ± 0.23	3.54 ± 0.35	3.94 ± 0.56	4.17 ± 0.68
50-Year	0.88 ± 0.20	3.18 ± 0.20	3.33 ± 0.23	3.61 ± 0.35	4.01 ± 0.56	4.24 ± 0.68
100-Year	0.95 ± 0.20	3.25 ± 0.20	3.40 ± 0.23	3.68 ± 0.35	4.08 ± 0.56	4.31 ± 0.68

Historic changes in sea level are documented at the Fortress of Louisburg in Northeastern Nova Scotia where the rings that fishers historically tied boats to are now completely submerged at high tide (as seen in Figure 4.5). Increasing sea levels pose the greatest risk to coastal communities when major storm events occur on a high tide, producing intense storm surges that cause flooding and increased rates of erosion. The intensity of storms under climate change scenarios are expected to increase, as well as move more northward, posing potential problems for Nova Scotia (Shackell 2012). While many studies predict increased storm frequency under climate change scenarios (Shackell 2012; IPCC 2014), a recent study indicates that while storms may become more severe due to the ability of warmer air to hold more moisture, large-scale storms are expected to become less frequent as a result of reduced atmospheric circulation in a warmer climate (Laliberté et al. 2015).

Figure 4.5: High tide marks at the Fortress of Louisbourg. (State of the Coast report 2009).

Data on the most flood prone areas in Nova Scotia is still in the preliminary stages due to the cost of LiDAR (light detection and ranging) data needed to make these projections. However,

a vulnerability map from 2005 shows the coastal areas expected to see the most physical change as a result of both sea level rise and subsidence in Atlantic Canada (as seen in Figure 4.6). At risk areas were determined using a sensitivity index resulting in the numerical values seen in the legend (Coastal and Ocean Information Network 2013). This map indicates the South Shore Region as highly vulnerable. Anecdotal evidence from my research interviews suggests particularly vulnerable areas within the study site include the waterfront in Shelburne and Liverpool and vulnerable wharves at Ingomar, Gunning Cove, East Side Port L'Hebert, Port Mouton, West Berlin and Hunt's Point harbours as well as the causeway connecting Lockeport to the mainland. These areas have all experienced major flooding events in the last two years.
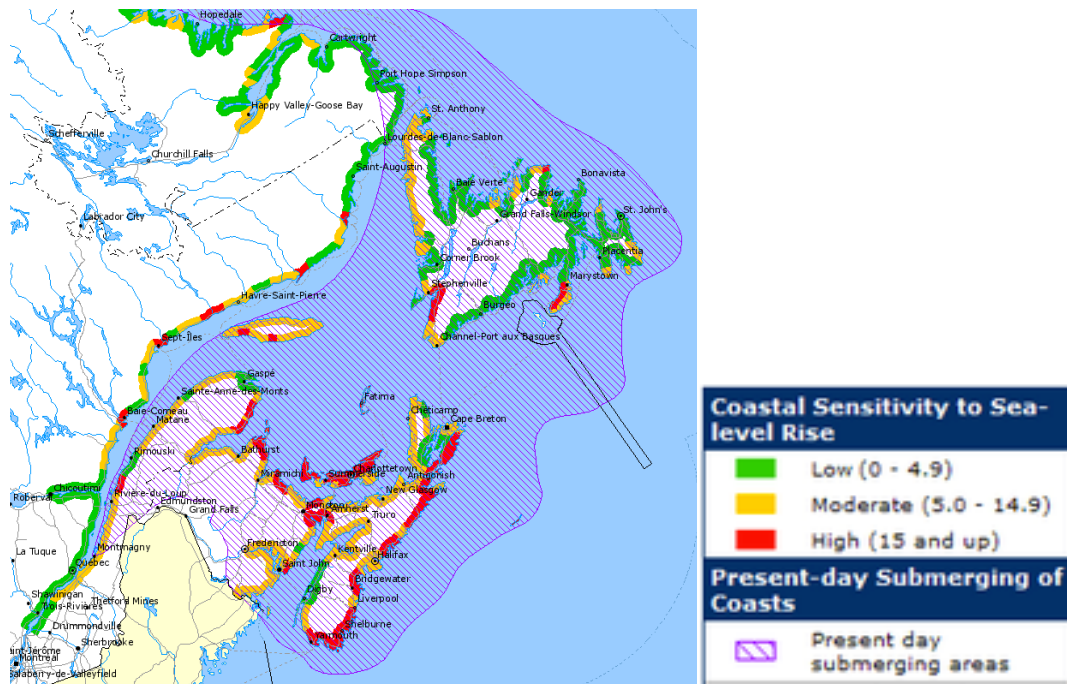
Figure 4.6: Atlantic Canada coastal vulnerability to sea level rise. (Image from CoinAtlantic 2013).

4.5.2   Temperature Increases

The IPCC's 5th assessment report indicates with 'virtual certainty' that the upper layers of the ocean have warmed significantly due to anthropogenic climate change (Rhein et al. 2013). Specifically, surface temperatures have increased an average of 0.11-0.13ºC per decade between 1971-2010, for a total of approximately 0.33-0.39ºC (Rhein et al. 2013). Ocean warming impacts spatial distribution of marine species, migration and reproductive behaviour, and contributes to sea level rise through thermal expansion of water particles. A study by Pinsky et al. (2013)

indicates that marine species distribution shifts in response to the rate and direction of climatic change. As seen in Figure 4.7 these findings help explain the observed increase in American Lobster landings in the Gulf of Maine and the Maritime Provinces, with fewer lobster being caught along the southeastern coast of the United States. Temperature changes in the air and ocean, along with earlier spring and later fall seasons can affect the biological cycles of migratory species. This can cause reproductive problems if individual species migrate or reach sexual maturity at different times, decreasing the likelihood of finding a mate (Nye 2010) and potentially impacting the viability of commercial fisheries. Ocean warming also contributes to sea level rise through thermal expansion of water particles. The IPCC report indicates that ocean warming contributes an average of 0.6mm/yr to sea level rise (Rhein et al. 2013). Moreover, warming has been shown to affect ocean currents, salinity, wave height and ocean biogeochemistry.
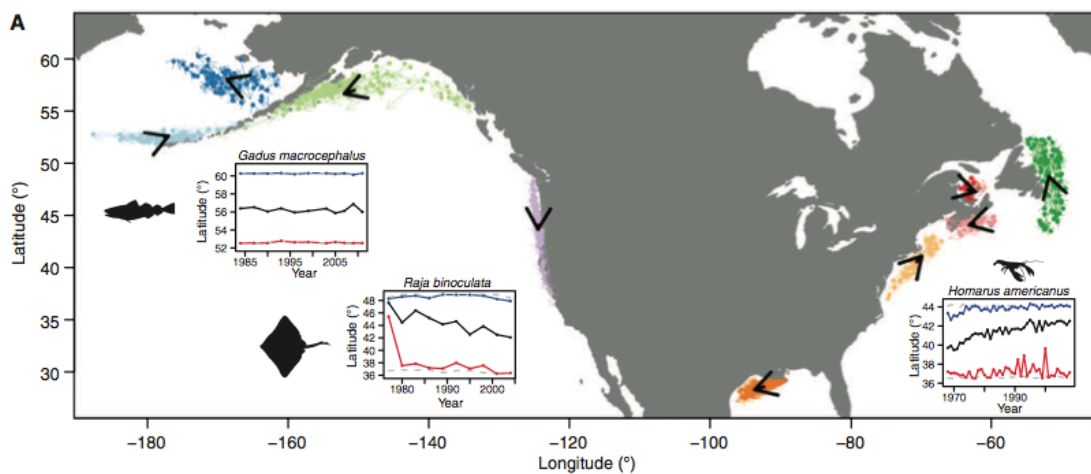
Figure 4.7: Species migration closely follows the velocity of ocean warming. (Pinsky et al. 2013).

4.5.3   Ocean Acidification

Since the Industrial Revolution, atmospheric carbon dioxide (CO_2) levels have increased dramatically. Oceans act as CO_2 sinks, absorbing carbon dioxide from the air. Dissolved CO_2 forms an acidic compound that consequently affects the pH levels of the ocean (Rhein et al. 2013). Increased ocean acidity can affect shellfish ability to produce hard calcium carbonate shells, benthic invertebrate survival, biological functioning of marine fish, growth rates for seaweed and sea grass as well as the social and economic systems dependent on overall ecosystem structure and function (Curran & Azetsu-Scott 2012). Since the early 1800's global

ocean pH has decreased (become more acidic) by 0.1 (Rhein et al. 2013) posing potential threats to the calcium carbonate shells of some invertebrate species.

In the North Atlantic, ocean acidification is particularly problematic for coastal communities as this region is a CO_2 uptake hotspot (Curran & Azetsu-Scott 2012) and highly dependent on shellfish fisheries and aquaculture (Gardner et al. 2009). The greatest amount of CO_2 is absorbed in the upper 400m of ocean (Curran & Azetsu-Scott 2012), the same layer in which the majority of commercial fish species are caught. However, more research on the extensiveness of the impacts of ocean acidification are needed as there are currently a dearth of long term studies in this field (Rhein et al. 2013).

Most of the research on ocean acidification focuses on the impacts on shellfish. Although species respond differently to increased acidity, many species produce less durable shells as acidity increases (Curran & Azetsu-Scott 2012). There is evidence, however, that blue crab, shrimp and American lobster may actually have higher shell productivity with increased acidity (Ries, Cohen, & McCorkle 2009). This does not necessarily imply increased benefit for these species as it is unclear what impacts harder shells may have. The vulnerability of shellfish to ocean acidification is particularly concerning in Nova Scotia as 80% of the total value of all landed fisheries comes from shellfish (Gardner et al. 2009).

4.5.4   Loss of Sea Ice

Global atmospheric temperature increases affect year round sea ice in the Arctic and winter sea ice in the North Atlantic. In Nova Scotia less winter sea ice is expected specifically along the North Shore of the Province, along Cape Breton Island and the Gulf of St. Lawrence (Leys 2009). Less sea ice, in combination with sea level rise and increasingly frequent storm surges, can negatively impact coastal communities. Fishers in Nova Scotia are affected by increased shoreline erosion, damage to port infrastructure and fishing gear, and harbour silting (Ecology Action Centre 2013). Research suggests that melting Arctic sea ice also causes gradual 'freshening' of the ocean (Greene et al. 2008). Decreased ocean salinity results in ocean stratification and can consequently affect the rate and direction of ocean currents (Nye 2010). This can cause problems for marine species that are sensitive to salinity changes and those which depend on currents for migration. Reduced winter sea ice cover in the North Atlantic also causes problems for marine mammals such as seals, which give birth on sea ice. For example, a

particularly mild winter in 2011-2012 resulted in hundreds of baby seals washing up on the shores of Northwestern Cape Breton (Pannozzo 2013).

4.5.5   Climate Change Adaptation Governance

Nova Scotia Environment developed a provincial climate change action plan entitled Toward A Greener Future in 2009 with the goal to reduce greenhouse gas emissions and prepare for the impacts of climate change (Province of Nova Scotia 2009b). As part of this action plan the Nova Scotia Climate Change Adaptation Fund was developed to encourage adaptation research and development. Critics of the plan indicate this plan is not thorough enough and suggest re-examining the need to continue investing in the offshore oil and gas industry (Ecology Action Centre 2009).

In 2010, the Nova Scotia government conducted public consultation workshops with over 1200 individuals in order to develop a provincial coastal strategy to shape how the province moves forward with policies affecting the coast and coastal communities (Province of Nova Scotia 2011). Yet, while there is valuable information in the draft of this report, the final version has not yet been published and there is no indication that it will be released anytime soon. The failure to produce this report means lost opportunities to identify adaptation priorities to protect and manage the coast (Graham and Mussleman n.d.)

In an agreement between Nova Scotia and the federal government, Integrated Community Sustainability Plans (ICSPs) are required by municipalities in order to receive federal gas tax transfers. Gas taxes collected at the pump are made available for redistribution to each province or territory where they were collected. Funds from the Gas Tax Transfer must be used for environmentally sustainable municipal infrastructure projects designed to increase economic, ecological, social, and cultural sustainability within a municipality (Canada-Nova Scotia Infrastructure Secretariat 2007). Nova Scotia municipalities were also required to submit a Municipal Climate Change Action Plan (MCCAP) as an amendment to their ICSP by December 2013. The goal of the MCCAP was to encourage municipalities to consider climate change adaptation strategies and how they can reduce greenhouse gas emissions from municipally owned buildings and vehicles (Canada-Nova Scotia Infrastructure Secretariat, 2012). MCCAPs were submitted in December 2013 by all three municipal units in the study site (Town of Shelburne, Town of Lockeport, and the District of the Municipality of Shelburne). Additionally,

the District of the Municipality of Shelburne published a coastal management plan in 2012 outlining progressive strategies to protect the coastline, anticipated climate change impacts and initial adaptation principles (Tipton 2012). While it is unclear what real impact MCCAPs will have on municipal adaptive capacity, their implementation is a step in the right direction because it requires municipalities to consider future impacts to their communities and develop necessary steps to avoid worst-case scenarios. Ideally, these plans and others like them will move beyond material dimensions and begin to consider the social dimensions that impact adaptive capacity in Nova Scotia communities.

4.6   Chapter Summary

The South Shore of Nova Scotia is highly vulnerable to the impacts of climate change, such as flooding, ocean temperature rise, ocean acidification and sea ice loss. Additionally, residents of this area are experiencing multiple drivers of socio-economic change common to many rural areas. These include higher than average unemployment rates, youth outmigration and an aging population. The fishing sector in particular is experiencing the compounding effects of these changes. Increasingly frequent and intense storm events put fishers lives at risk, species migration patterns change due to ocean temperature increases, and ocean acidification softens crustacean shells. Fishers throughout Atlantic Canada face the additional challenge of navigating a mismanaged and depleted fishery. Governance of the two primary fisheries in the study site, groundfish and lobster, as well as harbour management influence the ability of the fishing industry to adapt to environmental, social and economic change. The context provided in this chapter offers a backdrop to the research results presented in Chapters 5 and 6.

Chapter 5:   Perceptions of Change

"[Disagreement], that's just life. If we all agreed then we'd
be in one of those big ol' tents and everybody'd be hugging
one another!"

~Gary Dedrick, Birchtown

For the purposes of adaptive capacity research, it is important to consider not only scientific observations of environmental change but perceived change and vulnerability to risk. As Adger et al. (2009 p.345) point out, "…it is perceptions, values and norms that either enable or constrain action, thus either encouraging or limiting adaptation." Many of the biophysical changes presented in this chapter are similar to those in section 4.2 Biophysical Setting, meaning that in many instances change observed by members of the fishing community match findings from the scientific literature. However, in order to understand the capacity of individuals and communities to make adaptation decisions, it is important to first consider how they experience and understand what is happening in the world around them.

This chapter presents interview participants' perceptions of biophysical and socio-economic change. By expanding the focus from strictly physical or environmental change to include the broader social, cultural, and economic context of change, my research project allows for a more holistic understanding of how various factors influence adaptive capacity. This chapter includes youth perceptions of change as documented by the photovoice project (see Section 3.5 for further explanation). Engaging youth in this research project allowed me to gain important insights into how different generations understand change, as well as what factors youth consider when deciding whether or not to remain in rural coastal communities. The following sections documents multigenerational perceptions of social, economic and ecological change in South Shore coastal communities in accordance with research objective two.

5.1   Biophysical Change

Fishers' livelihoods are highly dependent on weather and climate conditions. Thus, it came as no surprise that interviews centered a great deal on storm events, changing weather patterns and ocean behaviour. Participants' observations about storms included their frequency

and intensity, damage to gear and boats, reduced fishing days, and safety concerns. Other observations revolved around sea level rise, shifting seasons and migration patterns of different commercial species, as well as ocean warming. Many participants remarked that these changes must be due to 'climate change' or 'global warming', while others were under the impression that the changes were part of naturally occurring cycles. Regardless of perceived drivers of change, anecdotal evidence suggests that unusual environmental change is being experienced in Nova Scotia coastal communities and is recognized as an issue of concern.

5.1.1   Storms

5.1.1.1   Frequency and Intensity

Over half of participants revealed perceptions of increased storm intensity. Participants used phrases such as 'more vicious', 'more windy', 'double in intensity', 'more stormy', 'more force', 'getting worse', 'scary' and 'I don't know what's going on' when describing recent weather trends. One DFO-SCH business manager commented that "what you considered a one in every twenty to twenty-five year storm now it seems like you're getting one of those a year, maybe two" (DFO-SCH 2, pers. comm., June 22, 2013). As mentioned in Chapter 3, a large storm took place in February 2013, five months before my research project began. The storm arrived on a high tide and resulted in flooding, boat and gear damage and an inability to fish for most of February. When describing the February storm, participants used words such as 'biggest storm I've seen', 'significant damage', 'unreal', and 'wild'. The proximity of this storm may have left concerns about storm intensity more salient in participants' minds. However, while over half of participants perceived storms to be getting more intense, six commented that storm frequency remains relatively unchanged. One participant noted that when storms arrive, they more frequently align with a spring tide (maximum high tide occurring on the full moon). These results provide some assurance that participants were able to distinguish between recent weather events and long-term climate trends.

Eleven participants observed changes in the wind, noting that windy days were more frequent and velocity more intense. Fisher 1 pointed out that, "it blows twenty mile all the time now. A few years ago…we'd get five or six days it would be just like this tabletop (flat calm waters). Now we [only] get five hours" (Pers. comm., July 23, 2013). Of the eleven who indicated winds were stronger, some cited fifteen to thirty knot average increases while others

pointed out the increase may not be a trend, citing two winters prior when they experienced very calm weather.

Although there was general consensus that wind and storms were indeed increasing in intensity, not all participants agreed that these weather conditions were abnormal. When asked 'Have you noticed any changes in the storms over your life?' one elderly fisher responded with 'not really'. It should be noted that harbours experience storms differently depending on the direction of the harbour opening. Therefore, a particularly intense north-easterly storm may be detrimental to a north or east facing harbour, while a south facing harbour receives a milder impact. This can result in perceptions of the same storm differing from fisher to fisher depending on where they were at the time.

Storms can also limit the number of days fishers can access fishing grounds. December, February and March were noted as particularly bad months for the 2012-2013 season. One fisher specified at the beginning of December his catches were up 5000lbs compared to last year, but by the end of December he was 5000lbs below last year's catches. Another fisher commented that:

I lost two of the best weeks lobstering that we have. And my traps aren't fishin' cause…I just put them [on the sand] basically to protect them and it did protect them but it didn't protect me too good cause I mean I lost two weeks…And we got out, I think, New Year's Day. First time in my life I ever fished New Year's Day, since I've been fishing.

(Fisher 5, pers. comm., May 23, 2013)

5.1.1.2   Gear Damage

Intense storms often result in damage to fishing gear, boats and infrastructure. Fishers reported badly damaged and tangled traps when they were left in shallow water during a storm. Boats can be damaged due to impact against the wharf or other boats in the harbour, and wharves can be broken and their footings damaged. One fisher described damage to his personal wharf in the February 2013 storm:

I've never seen the sea as high as it was this time. It was unreal. It was a bomb…the sea was coming up underneath the plank and it popped the plank off, course the lobster traps, that all fell and then there was one blocking that was quite weak…and that got worked loose…and I'd like to build back, but…I don't know if I can build one strong enough to withstand another storm like that.

Repairing damage due to storms increases the costs associated with fishing. In an industry that already has increasingly high start up and day-to-day costs, additional repair costs can be overwhelming.

A 91-year old participant, who continues to regularly fish lobster, said historically lobster fishers did not leave their gear out all winter. Rather they would land their gear and not fish during the stormiest months from the beginning of February until the Spring equinox on March 21st. However, because of improved trap durability with the use of wire rather than traditional wooden traps, larger and more stable boats and more profitable lobster, fishers generally opt to fish all winter.

5.1.1.3 Erosion

Damage from wind and storms can cause shoreline erosion. Participants who lived in the same region their entire lives often recounted stories of particular pieces of land that have eroded over time. A fisher from West Berlin harbour provides an example of one such experience:

> *The point just beyond the harbour, Blueberry Point we call it. When I was a kid the tree line would come out toward the end of the point and there was about a sixty or seventy foot grassy field from the tree line to the edge of the cliff and I can remember as a kid that there was a big ol' spruce tree about…twenty feet from the edge of the bank and that tree fell over about fifteen years ago, and now it's eroded into the point where it's almost into the tree line.*

<div align="right">(Fisher 21, pers. comm., June 19, 2013)</div>

In addition to lost land, fishers indicated erosion causes some harbours to infill with sediment. This can make it difficult for boats to leave the harbour if it is too shallow. Harbour Authority Board members indicated three harbours in the study site were facing increased costs associated with needing to dredge harbours more frequently.

5.1.2   Sea Level Rise and Flooding

Living and working on the coast allows participants to observe changes to oceans and tides. Many examples of higher tides and more frequent flooding emerged from the interviews. Flooding is particularly common when storm surges occur in conjunction with the highest high tides around the time of the full moon. Wharves serve as a unique measuring tool for sea level

rise as tide levels can be observed in relation to the height of the wharf. Sea level rise and flooding mainly cause damage to fishing boats and infrastructure.

Over two thirds of participants talked about changing tidal activity. Higher average tide levels were noticed, "the water comes up in the harbour [higher] on the wharf now" (Fisher 22, pers. comm., June 21, 2013). Other participants noted "[there's] more water in the ocean" and "our tide levels are rising significantly and regularly." Some participants also perceived changes in the frequency of high tides. As one fisher stated, "[At] one time you only had one tide a month, now we have two strong tides a month" (Fisher 3, pers. comm., June 27, 2013). It is unclear whether this observation refers to two higher than normal tides or that tides are perceive to be somehow out of sync with the lunar cycle.

In tandem with higher tides, thirteen fishers observed currents run stronger. Multiple fishers reported at high tide the buoys attached to their fishing lines and lobster traps are submerged. A fisher explained, "when I'm fishing in forty fathoms of water I usually use sixty fathom buoy lines…And certain times when you go out there you won't see a buoy at all. And so the tide has it pulled down because there's so much strain on your buoy lines" (Fisher 23, pers. comm., June 7, 2013). Although GPS systems on board boats help locate the specific location of fishing buoys, fishers have to wait until the tide goes low enough to haul the traps to the surface.

Of the thirteen participants who indicated currents run stronger, some specified the impacts to how longline fishers set their gear. A longline fisher explained how differences in the strength and direction of currents has changed the way he sets his lines:

> …in our younger years…we'd be five and a half mile apart and we'd set down all to the southeast, and you'd never pay no attention to which way the tide was going. But if you done that today you'd have what I had down there in Big LaHave. We were setting a line of strings out, we had six anchor snarls in nine of them strings. An anchor snarl is where it gets all balled up.

(Fisher Participant 1, July 23, 2013)

Strong tides can affect lobster catches in addition to costing time and money to deal with knotted gear lines. One fisher recognized this change could be due to fishing further off shore, "We are fishing deeper water mind you, that does make a difference but we do seem to have more tide

when we get them big high tides, it seems like [the tides are] runnin' fiercer than they used to"
(Fisher 14, pers. comm., June 21, 2013).

5.1.2.2 *Flooding*

The combination of higher tides and stronger currents in conjunction with increased storm frequency and intensity results in increased vulnerability to flooding. In addition to flooding in low-lying areas of the community, fishers are impacted by flooding at wharves. Flooding is most common when a storm surge caused by a low-pressure system coincides with the monthly high tide. The February 2013 storm that many people spoke about was one such event. Fisher 2 recalls:

We couldn't get out. I mean you couldn't even get down to the wharf. After a while the tide surge goes out. I mean it was unbelievable really, nobody'd seen anything like that... there was a boat up in the parking lot! There was one on the wharf and there was one in the parking lot, floatin'! ...The water was up just below my knees, above the wharf.

(Fisher 2, pers. comm., July 3, 2013)

Wharf flooding was a frequent topic of conversation. DFO-SCH harbour managers had the advantage of talking to many fishers at different harbours. One harbour manager mentioned that, "[A Harbour Authority president] told me that three times he's seen the wharf flooded like that and two out of the three have been in the last year" (DFO-SCH 3, pers. comm., July 2, 2013). Another Harbour Manager stated that:

A lot of the anecdotal evidence you get from these people who actually work in these harbours, [is that] over the years the water level on average has risen and they're getting more storm surge, more events that cause more problems, and you know you got areas that are flooded and roads flooded.

(DFO-SCH 2, pers. comm., June 22, 2013)

Two participants provided photos (see Figures 5.1 and 5.2) to show the extent of flooding at Ingomar and Jones Harbours respectively. Both photos were taken during the same flood event in February 2013, but evidence from the interviews suggests significant flood events, although not all at this scale, are increasingly frequent. Damage from flood events can affect wharf infrastructure, fishing huts, and boats if, as in the above example, they end up on the wharf or in the parking lot.

One fish buyer experienced flooding in her office, which is located next to the Lower Sandy Point wharf. Although there was no serious damage, she expressed concern that in the future if water levels come up much higher her business would be at risk.

Figure 5.1: Flooding at Jones' Harbour in February 2013. (Photo courtesy of Bill Barnes).

Figure 5.2: Flooding of Ingomar wharf in February 2013. (Photo courtesy of DFO-SCH).

5.1.3   Shifting Season and Migration Patterns

Spring and fall shoulder seasons have been shifting according to fishers and fish buyers. A buyer mentioned, "On the end of our seasons we're seeing that the lobsters are starting to moult. And once they moult then they won't trap" (Buyer 1, pers. comm., June 28, 2013). The same buyer mentioned that this season was the first time he'd ever seen a lobster moult in his holding tank. Whether this is a trend or a fluke remains to be seen. Warmer fall weather led to generally softer lobster shells in the 2012-13 season due to changes in when lobsters shed their hard winter shells and possibly also attributable to ocean acidification as mentioned in Section 4.5.3. Soft shell lobsters pose a problem for shipping, an issue that will be covered in Section 5.1.4. Buyer 2 noted the cod and haddock spawning season was arriving earlier in the spring.

Fisher 18, an Irish moss harvester, noticed peak moss growth happening later in the season and suggested the season start date should be pushed back to account for this change.

In addition to shifting seasons, migration patterns of lobster are changing, evidenced by fishers needing to go further off shore to catch lobsters. Many fishers mentioned having consistently placed experimental gear further offshore from their normal fishing grounds to no avail in the past:

> *We would fish probably half our gear inside, and there's a fairway buoy...roughly six miles from here. That's as far as we ever went. I would experiment every once in a while and take a string, like ten traps or twenty traps out somewhere and try and you'd get one or two lobsters and it wasn't worth your while. Now...we go outside of that fairway buoy before we even start. The majority of boats fish outside.*

> (Fisher 17, pers. comm., June 25, 2013)

Another fisher explains, "Lobsters are always in the harbour when the season opened at the end of November, now they're off twenty-five and thirty fathom when the season opens, they've already left the harbour" (Fisher 4, pers. comm., July 17, 2013). Participants reported that many inshore lobster fishers are setting their traps as far as fifty miles offshore, what is known as the fifty-mile line, the limit for fishers to be considered inshore vessels. Some fishers attributed this move further off shore to a phenomenon locally known as 'making bottom'. One fisher explained:

> *You would go to the outer extreme of where you could catch lobster and then go beyond that and you wouldn't get enough to make it viable you'd just get a few of the bigger lobsters. But then possibly the next year you could go that extra step where you caught those few lobsters the [previous] year and have good fishing there...and the further off we went we seemed to be making bottom.*

> (Fisher 21, pers. comm., June 19, 2013)

Likewise, a haddock fisher found he had to go much further offshore to find fish.

> *If you look way out on the horizon you'll see Gull Rock Lighthouse and haddock used to come in around there and now you gotta be in almost forty-five to fifty fathom of water in order to catch the things. They don't come in here anymore.*

> (Fisher 9, pers. comm., June 7, 2013)

Fishers attributed the recent abundance of lobster catches in part to shifting seasons and migration. Buyer 1 (pers. comm. June 28, 2013) stated that his company's lobster landings had doubled in the past five years. Milder weather affects ocean temperatures, which in turn affect species abundance and offspring survival.

5.1.4   Ocean Temperature

Fourteen participants observed ocean temperatures warming where they fish. However, two pointed out the 2011-12 season was colder than average. Changes to average ocean temperatures were cited as affecting quantity and quality of a fisher's catch. Warming oceans result in shifts to a species' range, as is the case with lobster described in Section 4.2. Range shifts can either increase or decrease the quantity of lobster caught in a particular region. Catch quality is also affected by temperature. This is particularly true of shellfish that moult in warm water and develop hard shells as water temperatures cool with the seasons.

Participants universally agreed lobster catches have increased dramatically. Multiple lobster fishers remembered landing record catches in the 1983-84 season, saying that landings have only continued to rise since then. Fisher 26 reported:

> *If you got a pound to a trap before, like you had 250 traps and you got 250 − 300 pound that was good. And every once in a while you'd hear of somebody getting 600 and that was like the talk of the town, 600 pound the first day lobstering! And all of a sudden, bang we've got 1700 pound the first day and I mean now we're catching 4000, 5000 the first day. Everybody said, 'aw next year it's not going to be as good, can't last' and now it's been like twenty years now it's been lasting.*

(Fisher 26, pers. comm., July 23, 2013).

One fisher suggested higher catches were possibly due to lobsters moving eastward. Moreover, warmer water means lobsters are more active and easier to catch than in cold water. Warmer water also means fishers can stay out for more days of the year. A harpoon swordfisher remarked "we've been fishing all winter because the water temperature's just been staying warmer by two or three degrees" (Fisher 10, pers. comm., June 28, 2013). Swordfish and halibut fishers indicated their landings have generally increased. Fisher 10 also pointed out that although swordfish are more abundant they have been harder to catch because they are more agile in warmer water (pers. comm. June 28, 2013).

Many participants recognized although lobster landings are increasing the quality of lobsters is declining due to warmer water. Fishers and buyers alike have noticed softer lobster shells on average, particularly lobsters caught in the fall when their shells would normally be hardening. Soft shells mean lower quality because the mortality rate is higher and those that survive have less claw meat, as they have not filled out their shells yet. When talking about the difficulty in shipping and marketing soft-shelled lobster, one buyer explains, "They're the first ones to go, usually to a processor. Processors don't want to buy dead lobsters, and they will, they'll die, they won't last" (Buyer 1 pers. comm., June 28, 2013).

An indication that average water temperatures are warming is the lack of sea ice. Eight participants recounted examples from their childhood of walking across frozen harbours in the winter, something they have not been able to do in recent years. Although a strong indication of change, the lack of sea ice was not necessarily considered a bad thing. One DFO-SCH participant explains how sea ice used to prohibit fishing during the coldest winter months:

> *Even twenty years ago harbours would freeze over and the boats were stuck there for two or three weeks or a month or whatever because I mean there's no ice breaking facilities unless you're in a place like Halifax or something…You don't get that anymore, you don't get a freeze up like you did before. I mean people used to walk across the back harbour on salt water ice and stuff and it never gets that cold now.*
>
> (DFO-SCH 2, pers. comm., June 22, 2013)

5.2 Socio-economic Change

In addition to biophysical changes coastal communities are also undergoing significant social and economic change. Socio-economic change refers to changes in the social structure of coastal communities and the individuals participating in fishing-related industries. Socio-economic changes in coastal communities include fishers' motivation to continue fishing, future generations' ability to participate in the fishery and the emotional and spiritual well-being of fishers. During participant interviews, challenges around socio-economic conditions were often raised before biophysical concerns. This may indicate the importance of subjective socio-economic conditions in fishers' day-to-day lives and decision-making processes. However, contextual factors such as the nature of interview participants and the weather at the time of the interview also determine which subjects permeated the conversations. To reflect the different

types of socio-economic change identified by research participants, I draw attention in the next several sections to demographics, resource access, economic viability, corporate interests and industry governance.

5.2.1 Demographics

Twenty-four participants cited population decline as one of the most concerning challenges facing Nova Scotia's rural coastal communities. Worker migration from these areas to cities and western provinces, particularly the oil and gas industry in Alberta was seen as the primary cause of population decline. Although coastal communities have a history of a migrant workforce with young people working onboard ships headed to Boston and Gloucester or traveling to the West coast of Canada to work in the fishery in Prince Rupert, current rates of outmigration were perceived as higher and more permanent than before. Perhaps most concerning, it seems to be not just young people leaving but mid-career fishermen. As one Small Craft Harbour manager reported:

> *I've got fishermen that own their own boats that are working out west now. And either getting somebody else to fish their boat or looking to sell it. I mean I was shocked, some of the better fishermen, it wasn't people that weren't making money. They get paid just as much and less work and it's guaranteed. Why would you want to put yourself through what they put themselves through?*

> (DFO-SCH 2, pers. comm., June 22, 2013)

Participants who were concerned about outmigration indicated population decline was negatively impacting well-being and quality of life in their communities.

> *When your population goes down your services go down, the quality of your services go down…Like our water, our sewer and things like that, plowing. The guys are trying but you can only do so much with what money is collected in taxes. And every time people leave, taxes go up and the people that are left just can't afford to do it. And they're gonna pull outta town too…I mean we've lost people here that were the backbone of the community and they're gone, they've gone out west or they've gone other places to get work.*

> (Harbour Supervisor 1, pers. comm., May 23, 2013)

Not only is the quality of services affected by population decline but also the quality of life. One participant's wife mentioned that her grandson was the only child in their community. He had no friends his age and was required to spend many hours a day riding the bus to and from school in the nearest town with a school. Community events and social interactions with neighbours were also impacted, "There's no social gatherings anymore, years ago they'd have pie sales or lobster suppers…none of that around here anymore. That was mostly put on by the women's church. Now the churches are gone" (Fisher 16, pers. comm., July 8, 2013).

Population decline has lead to a lack of reliable workers in the fishing industry. Lobster fishers generally hire one to two deck hands to haul traps and band lobster claws. These workers are often young people, some of whom hope to eventually own a boat and lobster license of their own one day. However, many of the ambitious, motivated youth who would have competed for these jobs in the past have left to work out West, making it difficult for fishers to find reliable workers. As on fisher stated:

> *Most of the good workers are in Alberta now, the good workers that you had to draw from…you're left with, well people that the last two days of lobster season decide to go on a drunk instead of goin' out and working…the ones that wanted to work left and went to work and a lot of people that don't want to work are the ones that stayed.*

(Fisher 11, pers. comm., June 20, 2013)

The lack of reliable workers is frustrating for someone operating a fishing business, and it can also impact the safety of fishers and their crew. A DFO-SCH business manager added, "There's a lot of fishermen that I know personally that can't find deck hands to go and when they get one he's inexperienced and it's a dangerous job right, it's nice to have somebody that's got some experience" (DFO-SCH 3, pers. comm., July 2, 2013).

While outmigration and migrant workers pose a problem for the quality of life of those who stay in rural areas and make it difficult to find reliable deck hands, the participants who indicated outmigration was a problem expressed varying degrees of understanding why people leave, "I'd rather have [my son and daughter] here. But you gotta go where the money is. There's no jobs here, so why stay here?" (Harbour Supervisor 1, pers. comm., May 23, 2013). Understanding that young people need to work out of province to provide for their families contrasted with the belief that rural communities have the potential to provide a high quality of life, creating a cognitive dissonance for many participants. As one participant expressed:

I mean if I was a young guy and I was ambitious, I don't think I'd be going and mortgaging my house and going to the bank for huge loans to buy boats and licenses. You know, it doesn't look that bright right now. I mean I'd go get a trade and head for Alberta, for the oil patch if it was me. And a lot of 'em are doing it, it's been going on there for five or six years that the young people, the people who could pack up in a heart beat and leave, have. And this past year or so there's boat owners tying up their boats and going in my community where I live. A lot of boat owners are going because they've hung on as long as they possibly can. You gotta do what you gotta do, you know. I mean I'm not right in love with it because these communities are going to die, but if there's no way to make a living here, you gotta eat, so you gotta do what you gotta do. Especially if you've got a young family and you have skills or could obtain skills then you gotta go do it. I mean I'm not right in love with the idea but it's reality.

(DFO-SCH 3, pers. comm., July 2, 2013)

Some participants encouraged their children to leave Nova Scotia due to a perceived lack of opportunity in their own communities. One participant, whose son was in the room at the time of the interview, explained, "I want to get him to go and learn how to drive big machines and then haul your ass west. Nothing here." (Fisher 12, pers. comm., June 18, 2013). However, not all participants felt leaving was a simple decision or even the best option. One young participant stated:

I would be so homesick I wouldn't be able to leave, I'd have to find something to do. But I know there's a lot of people that are leaving, [a lot of my friends] are going West...They move out there. They all seem happy once they get out there and they're making a good life for themselves, and a lot of times once one of them goes then the rest of the family will go with them. But for me I just couldn't personally leave.

(Fisher 25, pers. comm., June 12, 2013)

Another recognized:

The younger people would certainly like to stay around here, maybe not the first few years because they want to go and do the fast paced life, the university, the city life, party it up, but after a year or two, I mean that wears off pretty quick right. All of a sudden you realize well I can't go to the bar every night, so after that 80% of them would like to

come back here but there's just nothing here for them to do and that's sad, and I don't see it getting any better.

One participant noted that while some enjoy working out West others would rather stay in Nova Scotia, reinforcing the perception that even those who have established businesses in Nova Scotia (thus presumably preferring to stay) are now leaving:

[Working in Alberta is] not for everybody, some of them love it and they'll stay and they'll raise families out there and they'll live there and maybe stay there the rest of their lives. Some will go out with the intentions of making enough money to make it over the hump and I'm coming back home. And some go out there and just hate it, just can't be away from their families that long, some have relocated their families out there.

High outmigration rates mean the average age of fishers in Nova Scotia is increasing. Although this is true of the province as a whole, work in the oil and gas industry tends to disproportionately attract young men interested in physical labour jobs. This is the same demographic who traditionally entered the fishery, thus magnifying the effect on fisheries and resulting in a dramatically aging fleet. Additionally, the cost of entering the fishery has drastically increased, favouring those who bought boats and licenses years ago when the price was lower, meaning people who are older. One fisher stated that, "Anybody that you know owns their own house and their own boat and all that stuff can get by, but any young feller coming into it, he can't survive" (Fisher 15, pers. comm., July 12, 2013). A Small Craft Harbours business manager, who interacts with many people at multiple harbours estimated the average age of fishers in his region at 55-60 years old (DFO-SCH 2, pers. comm., June 22, 2013).

5.2.2   Resource Access

The ability for fishers to access the fishery presents another hurdle facing coastal communities. Loss of access is due primarily to increased expenses, heightened safety risks, and corporate monopoly over markets and licenses. Both start up and daily expenses make it more difficult for new fishers to enter the industry. Heightened safety risks on the water, due to fishing further offshore and fishing aggressively in order to make payments and secure a higher standard of living, have caused loss of life. Furthermore, corporate monopoly of groundfish quota, and the

fear that lobster would eventually move to a quota system and meet the same fate, limits the ability of independent fishers to access resources and markets for selling their product.

Buying the license, boat and fishing gear necessary to start a fishing business is expensive. Four older participants reported buying their first lobster licenses for twenty-five cents, whereas licenses have now increased to an average of about $180 000 CAD. Similarly, the price of boats has increased, partially due to new technology and devices aboard the boat. In addition to start up costs, daily and yearly costs are increasing. The prices of fuel, bait and hired help have all increased, while the perception is that the price of lobster has not increased at the same rate. As one DFO-SCH business manager put it, "You're talking about significant outlay of money to get involved and the last few years it hasn't been financially sound, nobody will want to go that far in debt to get involved in the fishery" (DFO-SCH 2, pers. comm., June 22, 2013). Higher expenses make it more difficult for new fishers, particularly young people, to get involved than it was for previous generations:

> *The younger ones like my son and all the ones in his age group are hurting big time cause they've had to pay big prices to get in it, and then the downturn in the price of the product they're catching, it's a job for them to meet their payments at times. I never experienced any of that cause I bought in for diddly-squat back in 1970, where now to buy into it you're looking at $150-$200 000 just to get in the business.*
>
> (Fisher 17, pers. comm., June 25, 2013)

Participants also perceived the combination of high expenses and low lobster prices have made it increasingly difficult to secure bank loans to start up a fishing business. Consequently, older fishers who have already paid off their boats and licenses, as well as those who have had a license passed down from a family member are able to do better in the fishery than those who have large payments. One fisher revealed that, "Every year I get ready to go it's 15-20,000 dollars for gear. It's a lot of expense. So if you have a couple of bummer years it don't take you long to get behind" (Fisher 26, pers. comm., July 23, 2013). While another admitted that, "these last five years I'm spending more than I'm taking in" (Fisher 14, pers. comm., June 21, 2013). A young fisher with high payments remarked that:

> *I'm a little different than most, you know a lot of them here all they do is go lobstering right. So they're quite comfortable doing that and they're a little older and things is all comfy for them, they're quite happy. But for me, I'm a little younger and have a wife and*

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kids and [a] mortgage and all that goes with it. Well, it takes a little more money to
operate than it does for them so I gotta go do something else right.

<div align="right">(Fisher 19, pers. comm., June 15, 2013)</div>

Some fishers admitted that while their costs have increased, so too have their living standards.

It's a changing world, people just want so much more, think they require so much more. I
mean back in my grandfather's time they didn't have too much at all and it didn't take
too much to keep that going. I mean, I've got satellite TV and Internet and all kinds of
things that they never had that we're paying for. They say that the cost of living is great
but we also create the problem I guess.

<div align="right">(Fisher 18, pers. comm., July 9, 2013)</div>

The need and desire to make more money has led to more aggressive fishing practices (staying out longer and in harsher weather), as well as fishing further offshore where, presumably, catches are higher. Such practices have lead to increasing safety concerns. Fisher 18 noted that, "Years back they probably didn't go as hard, like it would take less wind to stop the boats from going, now it takes a lot more wind to stop us from going" (Pers. comm., July 9, 2013).

Nearly all participants mentioned risk, death or accidents at sea during their interview. Many participants recalled the sinking of the Miss Ally in February 2013 when five young men from Woods Harbour, NS lost their lives. The men were halibut fishing over 100km offshore of Liverpool when a storm hit and their boat eventually sunk. All five men aboard were pronounced dead, although their bodies were never recovered (CBC 2013). The death of five young people has a significant impact on a small community, particularly when they were making a living and starting families in an area facing high youth outmigration rates. This event clearly had a large impact as many participants throughout the study site spoke about how the event had affected them and contributed their thoughts on how the accident could have been prevented. Explanations pointed to a combination of lack of experience, intensity of the storm and determination of the crew to empty their last traps before heading to shore as the causal factors. One fisher recalls:

All the other boats that was out there halibut fishing at the time, they all come in and they
begged him and begged him, got him on the set and said 'come on, get in outta there, it's

givin' a storm, it's gonna be a bomb' and 'oh no, I got more trawl to get yet and I think I
can ride it out, we'll be alright.' Wrong. It got dark.

<div align="right">(Fisher 17, pers. comm., June 25, 2013)</div>

However, one fisher remained unconcerned about safety issues despite recent deaths in the community and the observation that storms are becoming more intense. There remains a certain amount of pride in the danger encountered while fishing:

A couple years ago I heard them on the radio down in the States. They did a study of all
the jobs, 250 different occupations they studied and out of the 250 the most miserable job
was of course fishing. Yeah, most dangerous, dirtiest, least paid...made me feel good!

<div align="right">(Fisher 14, pers. comm. June 21, 2013)</div>

A representative from the not-for-profit Fisheries Safety Association of Nova Scotia expressed how the attitude of pride in the danger of the job makes it difficult to change the safety culture within the fishery in terms of encouraging fishers to wear personal floatation devices and carry safety equipment on board (Pers. comm. June 6, 2013).

Large lobster buyers were seen as having disproportionate control over prices and market availability. Large buyers were blamed for influencing the wharf price forcing small buyers to follow suit in order to remain competitive. A small buyer explains, "It's hard for us to give [the fishermen] a fair price, I can't pay $5 if everybody else is paying $3.50, I mean where am I gonna go with a $5 lobster?" (Buyer 2, pers. comm., June 28, 2014). Buyers in turn sell their lobsters to a shipper or a processor, all of who receive a profit off the price of each pound of lobster (Brown, 2014). Thus, it is in the best interest of the buyer to pay as little as possible for the lobster in the first transaction of this distribution chain. Perceptions of how large buyers are able to keep wharf prices low range from collusion to intentionally selling lobster for less than they are worth at strategic times of the year (Thériault et al., 2013). As one participant explained:

I think this year there's something that happened in the marketplace that was deliberate.
Two buyers went before our season in China and dumped lobster at $2 less than what
they paid for it for the sole purpose of driving the shore price down, then they could buy
inventory. As soon as we were stopped fishing the price went up by a buck the next day,
when we stopped fishing, and it's still going up.

<div align="right">(Fisher 27, pers. comm., August 4, 2013)</div>

Large buying companies were also blamed for limiting international market options available to individual fishers:

> *[As] an independent fisherman...I can sell my lobster anywhere in Canada. I cannot take it across the border into the States, [and] I can't ship it overseas. So the bigger buyers kinda make sure that there's regulations in there to stop anyone from shipping [lobster] themselves.*

<div align="right">(Fisher 21, pers. comm., July 19, 2013)</div>

A local buyer indicated they were able to compete by selling only the highest quality lobster, meaning hard shelled and limbs in tact. "We're dealing with a quality product, we're a young company, in amongst the big companies, but we've developed a pretty good name out there and that's what we're pushing" (Buyer 1, pers. comm., June 28, 2013).

Markets such as grocery stores were unlikely places for fishers to sell their product due to agreements between the grocery store and large suppliers.

> *[The grocery store is] being held up for ransom. Their supplier said 'alright, if you're gonna buy lobster from a local fisherman, we're not gonna sell them to you after their season closes. So in order to ensure a supply of lobster they have to buy from that one pound year round. And the only way that they can buy from a local fisherman is if [the pound] can't supply it.*

<div align="right">(Fsiher 21, pers. comm., July 19, 2013)</div>

Resource access has also been strongly impacted by an accumulation of fishing licenses in the hands of an elite few. In the case of the groundfishery, the move towards an ITQ management system (described in section 4.4.1) led to fish quota being bought and sold among different players. This resulted in large companies purchasing much of the available quota, to the detriment of independent fishing operations. Participants from various sectors expressed concern that the lobster fishery would one day be subjected to the same demise as the groundfishery. The lobster industry is protected by a fleet separation policy and an owner-operator policy. The former prevents processing plants from owning lobster licenses and the second states that license owners must also operate their own vessels. In spite of these policies, however, ten participants reported that under the table deals between large processing companies and indebted fishers, known as trust agreements, were becoming increasingly prevalent. One fisher described the process:

What would happen is a bigger company, like say Clearwater for example, they're going to come to me and what's happening is they'll say 'we'll take 52% shares of your company, of your business, your boat, we'll pay your boat, keep your loans taken care of and you fish for us', because they're not allowed to hold a license so for them to get control of me that license still has to be in my name but that's their way of getting control.

<div align="right">(Fisher 23, pers. comm., June 7, 2013)</div>

The accumulation of corporately-controlled licences results in a lack of independent decision-making for fishers. Individuals no longer have control over how much they bring in, when they go out, or what improvements they make to their boats and gear. One participant explained that in an independent competitive, fishery, "the harder you work your hands the more money you make" (Fisher 8, pers. comm., June 17, 2013). Under a trust agreement however, "…you're pretty much stuck with that guy that you borrowed money from…He's gonna get his money back and he's gonna get your product until he does. So it kind of limits you to what you can do" (Fisher 19, pers. comm., June 15, 2013).

Corporate monopoly over licenses can also limit opportunity for collective action. By limiting independent decision-making some fishers felt they would have less political power as an industry:

I think that these boats being controlled by companies are going to hurt big time for the fact that if we wanted to unite for example...they're not going to unite because they can't. They're gonna go [fishing] regardless. If we agreed to tie up [our boats], they're gonna go regardless because they're owned by companies, somebody's telling them people when to go right.

<div align="right">(Fisher 23, pers. comm., June 9, 2013)</div>

Although some maintained hope that there was a future for the independent fishery, many such as this harbour supervisor, were less optimistic:

Corporatization is not that far down the road, and then we're going to have our young people hired for minimum wage to work on a corporate vessel and the days of the independent owner-operator will be gone. It's just too bad, it really is.

<div align="right">(Harbour Supervisor 4, pers. comm., June 5, 2013)</div>

DFO-SCH employees also expressed concern over the direction of the fishery, going as far as to say the federal government would prefer a corporately controlled fishery:

> *Over the years it seems that the big corporations have gained control, I think the days of the independent fisherman are numbered…I'm not overly optimistic. I think it's going to be the way of the corporations will control the lobster the same as they have every other fishery to date. And I think the government would rather have it that way because there's less people to deal with. They don't like really dealing with independent fishermen, with associations and stuff like that, they would rather deal with corporations, easier on them…And you obviously see some of that now with Clearwater, they control the offshore scallop fishery, you don't see any price fluctuation in that because they control the supply and demand.*

<div align="right">(DFO-SCH 2, pers. comm., June 22, 2013)</div>

One participant, who worked as a DFO Fisheries Manager during the height of the groundfish crisis, critiqued the federal government's position on the independent fishery:

> *I'll tell you there's a lot of fishermen now that would love to have them come down and buy their licenses out, cause things are not really very good right now, but that's because of being starved out. And every time they organize and start to fight back, then all of a sudden you get this flow from the top that says we'll go into quotas and let the big companies manage this for you…And what they don't seem to understand is that boats don't catch fish, fishermen do. And if the fishermen aren't motivated, they aren't going to catch fish. And you know, the companies come and the companies go, they could walk out on you on a moments notice. I'm not flying the flag for the fishermen per se, my flag flies for the local fishery. That people that are there can fish from their homes, can land money that benefits everybody around them, every store, every infrastructure along this coastline depends on them.*

<div align="right">(Harbour Supervisor 3, pers. comm., June 6, 2013)</div>

5.2.3   Economic Challenges

Heavy reliance on the federal employment insurance fishing benefits program (EI) was blamed primarily on the collapse of the groundfishery, and consequent loss of access to a year-

round fishery. However, both low lobster prices and a lack of income predictability were mentioned as additional contributing factors to economic uncertainty.

The price of lobster fluctuates throughout the year, generally starting low at the beginning of the season when landings are high and peaking in February and March, which are typically low-landing months due to storms preventing fishers from going out and cold water slowing lobster metabolism, making catches difficult. Despite lower prices at the beginning of the season, catches in early December can determine annual income for South Shore fishers due to the economic importance of the European Christmas market. Later in the season, buyers and shippers have lower demand for their product and thus prices are higher, but typically fishers are catching fewer lobsters at this time of the season. During the 2013-114 season however, catch rates were substantially higher than previous years leading to a lobster glut where product accumulated in holding facilities. As one buyer described the situation:

> *What happened in December of this year, the lobster catches were up, everybody was swamped with lobsters including ourselves, we had nowhere to go with them, so we're selling to processors, we're selling to whoever so that we can make room so that we can keep buying, we didn't want to stop buying, once you stop buying you lose that boat.*
>
> (Buyer 1, pers. comm., June 28, 2013)

However, as discussed in the previous section, price does not always correspond directly with supply and demand due to external influence and corporate control. Generally, fishers exhibited a lack of understanding about how lobster prices were determined. When asked how the wharf price for lobster is set, three fishers responded with, "I don't know nothing about it", "not being smart but I'd like to know myself!" and "I don't know who in the middle is making the money". When asked the same question, a buyer replied "I'm not the one deciding the price… basically it's a supply and demand situation" (Buyer 2, pers. comm., July 11, 2013). She went on to explain that she sets prices according to business software owned by the company's head office and determined by global lobster sales. Some participants acknowledged that, "[When] we weren't catching as much we were getting more for it and [when we were] catching more, getting less for it. So dollar wise it's not a lot different" (Fisher 18, pers. comm., July 9, 2013). However, the majority felt it was challenging to fish when the wharf price was low, regardless of how many lobsters they caught:

Twenty-five years ago we sold the fresh lobsters for like $4 now we're selling [for around the same amount] ...we're catching twice as much but the expenses is so high. Like boats and stuff is three or four times more than what they were, traps and fuel and everything, the cost is a lot higher. So we're making about the same but not like we should.

<div align="right">(Fisher 10, pers. comm., June 28, 2013)</div>

Overall, a feeling prevailed among lobster fishers that fishers were at a disadvantage.

Fisheries income is weather dependent, as one participant stated, "you never know from season to season, day to day, week to week, if you're gonna be able to work, what you're gonna make" (Fisher 18, pers. comm., July 9, 2013). Participants acknowledged that other occupations such as farming were subject to a similar degree of uncertainty. However, with ever increasing expenses, a lack of income predictability can be the difference between staying in the fishery or getting out of it for some fishers. One suggested response to this problem was to establish a minimum price for lobster that would ensure fishers a more consistent income. One fisher suggested:

Like a minimum of say $4.50 [per pound] or something like that, $5. On an average, even if we only got $5 for the whole year we'd make a fairly good living and the fish buyers would know what they have to pay...we went for $3 last year, because we have to. There's nothing else to do and you gotta do something. So now the big buyers are thinking 'alright, they went for $3 last year, maybe we'll either keep it at 3 or go $2.75 next year' I mean it's just like they're trying to break you.

<div align="right">(Fisher 26, pers. comm., July 23, 2013)</div>

Most fishers rely on federal EI to supplement their income. This is largely a result of low lobster prices and a lack of income predictability, in conjunction with the loss of a stable groundfishery. While some participants willingly collect EI, some wish there were other options that would allow them to work for their income. However, most recognized that temporary unemployment is a reality of their line of work. "The Maritimes is made of seasonal workers, not only fishermen but your farmers and then your lumbermen, it's all seasonal work mostly and there's nothing else much that isn't seasonal, that's a maritime way of life" (Fisher 7, pers. comm., June 14, 2014). Some participants admitted that readily available EI funds made it difficult to find deck hands, some of who would prefer to collect EI than take the risk of fishing

and making less than what EI provides. Others knew people who had found loopholes in the system that allowed families to collect more, or collect more frequently. Alternatively, many participants pointed out that while there are those who abuse the system, the majority apply for EI honestly. Some felt a lack of self-efficacy by being bound to the EI system. As one participant admitted,

> *If we didn't have the payments [for boat and fishing license] right now, we'd be laughing. Like I don't figure we'd have to draw unemployment…if I didn't have to draw it I wouldn't…I just don't like abusing something that I don't really need, the way a lot of people do.*

<div align="right">(Fisher 13, pers. comm., July 11, 2013)</div>

Twenty-two fishers spoke on the topic of EI, with three indicating they did not draw benefits. Two of these owned boat-building companies, so were ineligible for EI and one simply did not want to receive income assistance.

5.2.4   Governance

Governance refers to "…formal and informal rule-making systems, and actor-networks at all levels of human society (from local to global)…set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change" (Biermann et al. 2005 as cited in Pittman et al. 2015). While fisheries governance extends to a multitude of institutions and processes, the most common examples from the interviews refer to traditional lobster fishing boundaries and Harbour Authority management. Volunteers fill many local fisheries governance roles and volunteer burnout was frequently referred to as an ongoing problem. This applies to volunteer roles within the community such as firefighters and religious organizations as well as within fishing associations and Harbour Authorities. Governance issues could be further applied to fisheries management processes, fisher-scientist collaboration, and conservation measures. However, for the purposes of this section, governance results are limited to the tension that arises between fishers who recognize different fishing boundaries and the problem of volunteer burnout within Harbour Authorities due to increasing responsibilities undertaken by fewer volunteers.

5.2.4.1   *Traditional Lobster Fishing Boundaries*

Although lobster fishing areas (LFAs) are legally determined and patrolled by DFO, historically fishers developed mutually agreed upon boundary lines for each harbour. Traditional

boundaries were meant to increase fairness and reduce the chances of fishers setting trap lines over one another, causing damage to gear.

> *The old fellas used to have these old gentlemanly lines that you weren't allowed to go fish over here because if you fished from here you could only go so far with your boat and gear…Our unofficial boundaries would be…in from the Bay and run off to the Brazil rocks and run right off the shore and then go down as far as where White Point Lodge is and come off of there.*

> (Fisher 19, pers. comm., June 15, 2014)

No regulating body has ever enforced traditional boundary lines. Fishers took it upon themselves to patrol their territory:

> *Years ago they used to haul your traps up and if I was from Sandy Point and I got too far over here around Jordan Bay this fella here from Jordan Bay might haul my trap up and put my buoy in it…Send it back to the bottom…and I might never find that trap again. Or he may cut my buoy right off. Or they might haul your trap up and beat it up. That was years ago, the old folk.*

> (Fisher 5, pers. comm., May 23, 2013)

In recent decades, traditional boundaries have mostly dissolved as boat size, capacity and number of lobster fishers in a given area have increased. The modern fishery, specifically younger fishers, tend to follow the federal rules that a license issued in a particular LFA is legally allowed to fish anywhere within that LFA. Within the study site this meant fishers could be anywhere in LFA 33 from Baccaro Point up to Sambro. One participant described the change from traditional to legal boundaries:

> *There's people from different areas come here with boats and it seems like everybody's getting along a little better and sort of accepted it, but you have to because there's nothing you can do about it. But the older generations are sort of set in their ways and they have lines and you don't cross this line…but people's attitude has changed.*

> (Fisher 10, pers. comm., June 28, 2013)

Although attitudes are changing, the tension between legal and traditional territory can still lead to conflict. One young fisher exercising his right to fish anywhere within the LFA recounted, "this spring now I think they cut about twenty traps off of me…I know who done it, so I retaliated and I cut sixty or seventy off of him. Then he left me alone" (Fisher 22, pers.

comm., June 21, 2013). This form of self-patrolling can apply not only to traditional boundary enforcement but trap poaching as well. Two participants mentioned having someone in their harbour that was known to haul other fishers' traps, stealing the lobster catch. As one fisher described, "We had one fella, he lives right up here, he hauls people's traps…He'd go out at midnight and he don't come in until the same hour we come in…[people] know it's happening" (Fisher 24, pers. comm., June 18, 2013). Some participants brought up a recent extreme case of self-patrolling in Cape Breton where a man known to poach traps in a small community was shot and killed by another fisher in retaliation. This example shows that self-patrolling rather than going through the legal system still exists in some circumstances.

5.2.4.2 *Harbour Authority Management*

As described in Section 4.4.3 DFO-SCH has been devolving what are considered 'core fishing harbours' from federal jurisdiction to a co-management arrangement between federal and local level stakeholders in the form of Harbour Authority boards. The Harbour Authority appears to be functioning well as an effective means for harbour governance according to both fishing participants and DFO-SCH representatives. Initially many fishers were not impressed with having to pay a berthage fee to tie up to a wharf they previously had accessed for free. The $200-$400 per year fee is now seen by most to be worth the increased funding for harbour infrastructure and increased communication and guidance received from the federal government in the form of DFO-SCH business managers. As one participant explained:

> I think [the Harbour Authority is an effective way to govern the wharf] because it's become more personal and the Harbour Authority goes after things that we need for repairs and so on whereas before we just would contact our MLA…nothing ever got done, things were falling apart. And now I would say it's more personal, we all pay our dues for our berths every year and we have a very nice facility there and there are a few that abuse it of course and throw their oil cans in the water and there's still that mentality around, but for the most part it's clean and it's a good wharf to lay to.

(Fisher 26, pers. comm., July 23, 2013)

From the perspective of a harbour supervisor, hired by the Harbour Authority for day-to-day management tasks, fishers are taking more of an ownership role in managing their harbours as a result of paying for and being involved in the Harbour Authority system.

I think [the Harbour Authority system] is very effective and I think it fits well…Basically what it does is, [fishermen] are starting to learn that if they want input then they have to accept accountability and responsibility. So it brings it to their attention. And of course the hardest thing to get over is that they look at it as 'I don't care if I break something, it's the government's'. To try to make them understand that no it's not, it's yours now. And there is a major capital investment by the taxpayer and you have an accountability to look after it and manage it well.

<div align="right">(Harbour Supervisor 3, pers. comm., June 6, 2013)</div>

The Harbour Authority applies to Small Craft Harbours for wharf improvement projects such as new ladders or a skidway so they can work on their boats. Small Craft Harbours uses a point scoring system to prioritize how funding is allocated among harbours. The point criteria were summarized by SCH Business Manager Graham Smith to include the number of vessels, value of the product, amount of fish landed, wharf condition (ie. risk/safety factor), efficiency, willingness to contribute either labour or money to the project, economic spinoff benefits, financial statements in on time, paid manager, user fees in place, signed license agreements with all users, complete membership list, business plan, proper signage, long range plan, environmental management plan, and harbour isolation (more points for isolated harbours). The idea behind the Harbour Authority contributing labour or money to the project is to increase fishers' sense of ownership toward the harbour. As one Harbour Authority president pointed out:

If you're applying for work done and want them to pay for the whole thing you haven't got nearly as good a chance of getting it approved as if you were gonna pay a portion of it. And we always look into any project like that to see if there's some portion of that that we can do ourselves as partial payment.

<div align="right">(Fisher 21, pers. comm., June 19, 2013)</div>

In the above situation the harbour required a new skidway and pier for fishers to pull their boats out in order to work on them. In a cost sharing agreement DFO-SCH provided the funding for materials but the fishers contributed their time to actually purchase materials and physically build part of the infrastructure.

Despite a history of mistrust and confrontation between federal DFO employees and fishers due to poor management of the groundfishery, the Small Craft Harbours branch seems to be an exception. One fisher admitted, "[Of] all the guys from DFO in Small Craft Harbours I

haven't met a bad one yet" (Fisher 20, pers. comm., June 11, 2013). One Small Craft Harbour business manager explained why this might be the case, stating that even though the role is technically about securing harbour infrastructure projects there is an important relational aspect of the job:

> *If you go down there and talk to them about the new designed lobster trap that they're working on, and how's that new test style of bait that you're using? And how do you like the new boat with the open stern in it…that will go a lot further than knowing how to build a wharf. I can go down there and first thing outta their mouths are 'hey, how's the kids? What's going on?' You know that kind of thing. As opposed to 'we need this' or 'we need that'. We sit and talk for a minute first, so I've had a pretty good relationship with them.*

<div align="right">(DFO-SCH 3, pers. comm., July 22, 2013)</div>

Small Craft Harbours classifies harbours into A-class, B-class, or C-class depending on the number of members and degree of usage throughout the year. A-class and C-class harbours (the largest and smallest) tend to work best under the Harbour Authority system according to all three DFO-SCH Business Managers interviewed. One Business Manager explains:

> *If you're large you seem to do better because you have resources to hire people on to enforce your policies and procedures and rules and regulations, if you're small everybody's part of that decision making process…It's the mid-sized ones where you have a few that step up and you can't afford to hire somebody directly.*

<div align="right">(DFO-SCH 2, pers. comm., June 22, 2013)</div>

A Harbour Authority president from a C-class harbour concurs:

> *When we have a meeting we're pretty much all there. And you know, we have our president and vice president, treasurer, secretary, and then the other 3 would just be advisors right. So pretty well the whole seven of us are involved [in the Harbour Authority Board].*

<div align="right">(Fisher 21, pers. comm., June 19, 2013)</div>

For some harbours, including most B-class (mid-sized) harbours, the Harbour Authority system was recognized as having some drawbacks. The responsibility of having fishers manage their own harbour can be complicated for multiple reasons. First, many fishers struggle with the

day-to-day tasks involved in operating an organization such as a Harbour Authority. As a DFO-SCH business manager pointed out:

> *The older guys were smart…very savvy when it came to catching fish and running boats…but we've kinda dumped harbour management on 'em too and some of 'em didn't have the educational background. I mean there's still a few of the older guys that can't read and write, smart as anything, can catch lobsters with the best of 'em but they just don't have the book learnin' so to speak.*

<div align="right">(DFO-SCH 3, pers. comm., July 2, 2013)</div>

Second, operating a Harbour Authority presents logistical issues, particularly during the busiest parts of the fishing season:

> *These guys are fishing and they're active. I mean they're going sometimes two or three o'clock in the morning, not getting back until six or seven at night and you try to get a meeting with those guys during that time…I mean these guys are tired, they're coming in [and] now they gotta make a phone call and try to get something done so, you're asking a lot of them to take over the management of a harbour…That's why it's almost critical to have a support mechanism in place where you have somebody*
>
> *that can take over.*

<div align="right">(DFO-SCH 2, pers. comm., June 22, 2013)</div>

Third, asking volunteer fishermen to collect fee payment and deal with conflict among their peers makes enforcement difficult. The Vice President of a large Harbour Authority explains, "It's a thankless job and nobody's ever satisfied with what you're doing…they think…you should be settling disputes and I just don't want to get involved in those disputes between people" (Fisher 18, pers. comm., July 9, 2013). Feeling as though it is a "thankless job" with no pay results in little motivation to solve complicated problems. A DFO-SCH business manger explains:

> *Volunteers…they're not as persistent if somebody owes them money, like collecting fees, because it could be their neighbour or their relative or somebody they fish along side and they don't want to antagonize them because there's some repercussions on the water sometimes. So the volunteers I find at the Harbour Authorities aren't as forceful as paid managers.*

<div align="center">92</div>

That support mechanism often comes in the form of a hired Harbour Supervisor, someone who is not a fisher and removed enough from the industry to be able to enforce rules. However, generally only large A-class wharves have the budget to be able to hire a Harbour Supervisor. One participant in this position described the important role she played in quelling conflict over wharf space:

> *[The Harbour Authority] would decide where [fishermen] were going to put their traps on the wharf. And that's quite important because there's good spots and bad spots. So [the fishermen] were always really ticked off of how this was done. And like…draw names out of a hat! It's so easy right. So just to get those things in place so that you just take it down a notch from the competition they have so that they work well with each other, things are fairer, they believed in being fair. So just administrative stuff that needed to be ironed out.*

When asked if the Harbour Authority system was an effective way of governing wharves, the same Harbour Supervisor expressed concern with the overall structure of the system:

> *It's not bad, [but] I think there's some areas for improvement. Communication tends to break down, projects get kind of shuffled around and then it seems like Public Works who are the ones who engineer some of these projects make these decisions and they're supposed to have consultation with the fishermen and sometimes [they] fail to do that and then they move ahead and then it backfires and they're not listening…There've been times where they've done something and I'm like, 'that's not what I thought we were doing' and there's been no consultation or meeting…I don't like the structure really. That's the patriarchal type of structure, that you get this pyramid thing and you go up and down. I'd like it to be a little bit more team and communication.*

5.2.4.3   *Volunteer Fatigue*

In many harbours the responsibility for operating the Harbour Authority falls on the shoulders of a few dedicated volunteers. Unsurprisingly, those who volunteer to be on the Harbour Authority board tend to be the same people who volunteer for other necessary roles in the community:

I find the guys who are actively involved in the Harbour Authority are also volunteer firefighters, minor hockey coaches, or baseball coaches, they're in the Legion or the Lion's club or the curling club…They're the volunteer core, the people who are involved in their community. That's the people you usually get in. Right now [the major problem] is burnout.

(DFO-SCH 3, pers. comm., July 2, 2013)

Not only are the same people volunteering for everything and burning out, but also, for the reasons mentioned above, the role itself is not particularly coveted. In regards to the role of president of the Harbour Authority, one fisher bluntly stated, "it's one of them glorious jobs that nobody really wants to take" (Fisher 19, pers. comm., June 15, 2013). This aversion to volunteerism seemed particularly true of young fishers entering the industry, and with an aging population of fishers, Harbour Authority succession could be a problem. One participant explains, "There's one or two people that are the catalyst, the glue that holds these [Harbour Authority] groups together, and when they go you wonder what's gonna happen here because I just don't see that new generation coming along to take over" (DFO-SCH 2, pers. comm., June 22, 2013).

Some larger harbours such as Port Mouton and Lockeport still have young people involved in lobster fishing. However, the lack of interest in volunteering their time to serve on management boards is seen as problematic for harbours with an aging fishing population. Despite a general lack of interest from young fishers to be involved in the decision making process, one SCH business manager acknowledged that the younger generation are perhaps more capable of operating a harbour authority:

The younger people who are getting in the fishery now seem to be more educated than the older guys. Which helps in a way because they're more computer literate, they can search on the Internet for other options and how Harbour Authorities are run in BC for instance, they have more business skills possibly.

(DFO-SCH 3, pers. comm., July 2, 2013)

Volunteer burnout can impact far more than just the Harbour Authority in communities that rely on a volunteer core in order to operate. Although downloading harbour management from the federal to the local level resulted in fishers taking more ownership and responsibility for the harbour, it also meant increased responsibility for an ever-shrinking group of volunteers.

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5.3 Youth Perceptions of Change

It was important to capture the perspectives of not just those currently involved in the fishing industry but also potential future generations of fishers. In order to do so youth participants were asked to take three photos of places that were important to them in their communities and three photos of places where they would like to see change (see Section 3.5). The individual and group conversations that resulted from looking through photos with participants covered three main categories: a lack of opportunity within their community, a desire to see infrastructure improvements, and a desire to leave but also to be able to return to live in their communities in the future. Participants came from the communities of Shelburne, Lockport and East Sable River.

5.3.1 Town Upkeep

All participants took photos that indicated they were not satisfied with the upkeep of their communities. The photos in Figure 5.3 A and B show the Allendale wharf and the trestle bridge in Lockeport respectively. Youth Participant 4 explained both structures required maintenance to rotting boards and in the case of the wharf new ladders were needed. In regards to the trestle bridge the participant commented that, "it's getting in rough shape, the boards underneath of it, some of them are rotten…if they could maintain it more and just take better care of it, just upkeep it a bit I would say" (Youth Participant 4, pers. comm., July 28, 2013). Both the bridge and the wharf were important places for fishing mackerel, playing, and spending time with friends, family and alone. In Figure 5.3 C Youth Participant 2 noted that "[Our] road really isn't looked after as well as others" (Pers. comm., July 29, 2013). Youth Participant 3 explained she wished someone would do something with the vacant lot near her house, shown in Figure 5.3 D. Youth Participant 1 offered insight into why she perceived town maintenance was a problem in her community, "I feel like the people in charge of it think that there's no one here, so there's really no point. But if they did something more people would want to come" (Pers. comm., July 27, 2013).

Figure 5.3: Photos describing the need for town upkeep. A) Dirt road with lots of potholes (Youth Participant 2). B) Trestle bridge in Lockeport missing some planks (Youth Participant 4). C) Allendale wharf missing planks and ladders (Youth Participant 4). D) Vacant lot in Shelburne (Youth Participant 3).

5.3.2   Lack of opportunities

All youth participants perceived a lack of opportunities in their communities, including social activities and employment opportunities. Youth Participant 1 took a picture of the old movie theatre in Shelburne (Figure 5.4 A). She explained, "It's kind of just closed and no one

really does anything with it. And it'd be better if they opened it so people could watch movies" (Pers. comm., July 27, 2013). Another compared the opportunities in rural communities with those in the city, "[In Halifax I can] go to the mall for a couple hours, then go out somewhere to eat, then meet up with a couple friends and do whatever, but here you can't do that. You're a bit more limited" (Youth Participant 2, pers. comm., July 29, 2013). The Shelburne library has a youth reading program, but as Youth Participant 1 candidly pointed out in Figure 5.4 B, "The library hours, they suck" (Pers. comm., July 27, 2013). Figure 5.4 C portrays the location of the old Shelburne high school, now a grassy field. One participant suggested a playground would make the space more usable for kids and youth. In a focus group discussion, participants listed the types of things they would like to have available in their communities, including a shopping mall, movie theatre, jobs, a university, busses, cafés, shops, and more people. Additionally, young people acknowledged a lack of employment opportunities for them in their communities. Youth Participant 2 took a photo of two local businesses, a restaurant and a gas station right next to each other that had recently closed down (Figure 5.4 D) mentioning that he would like to see, "More employment opportunities in the area because there's really only one and it's the other gas station" (Pers. comm., July 29, 2013). Youth Participant 2 had found some work in a neighbouring community during his summer home from university, but only for a limited period of time:

> *I did work at a seafood processing plant for a couple weeks doing the night shift and that didn't last very long because I joined late and I only got four weeks of work in before everything was all done.*

(Pers. comm., July 29, 2013)

Youth Participant 2 recognized that due to a lack of employment options, "All the younger generations are going to go to the city for schooling or employment, they're going to move away" (Pers. comm., July 29, 2013).

Figure 5.4: Photos representing a lack of opportunities. A) Closed movie theatre in Shelburne (Youth Participant 1). B) Restricted library hours (Youth Participant 1). C) Empty field at location of old school (Youth Participant 3). D) Closed restaurant and gas station on Hwy 3. (Youth Participant 2).

5.3.3 Outmigration

All participants expressed a desire to leave their communities at some point in their lives. However, they also all expressed mixed feelings at the thought of leaving and two participants explicitly stated that they would like to have the opportunity to come back and work in their communities in the future. Youth Participant 3 expressed, "I don't really like Shelburne that much, I don't really like living here" (Pers. comm., July 24, 2013). Similarly, Youth Participant 1 said, "I kind of want to leave Nova Scotia just because I've lived here forever and I'd like to experience something new" (Pers. comm., July 27, 2013). When asked if she could see herself coming back to Shelburne at any point, Youth Participant 1 responded, "Maybe when I'm older." Youth Participant 4 was considering a career that would bring him back to a nearby community, although not to his home community of Lockeport in particular:

> *I've always wanted to be a conservation officer or a fisheries officer. But if I did that I wouldn't have a job in Lockeport because you're not allowed to have a job in your*

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hometown because if you have a grudge on a fisherman or something. So I'd have to be

maybe [in] Liverpool or Bridgewater.

<div align="right">(Pers. comm., July 28, 2013)</div>

Youth Participant 2 took a photo of the wharf in his community (Figure 5.5) where his dad used to fish before he got out of the fishery for financial reasons. When asked whether he had considered fishing as a career, Youth Participant 2 responded with:

I was told no matter what you do don't be a fisherman…and I was ok with that because I

saw what it was like. I knew how hard it was seeing dad come home at three in the

morning tired and only getting two hours of sleep.

<div align="right">(Pers. comm., July 29, 2013)</div>

Youth Participant 2 was currently attending university in Halifax but at his parents' home on the South Shore for the summer at the time of the interview. He indicated although he enjoyed living in the city he would like to have the option of living in his home community. In an ideal situation, "If I wanted the convenience of the city I could go there. If I wanted the scenery of here I could live back here" (Pers. comm., July 29, 2013). One participant summed up the general feeling about outmigration well when she said:

I want to go to either Halifax or Ontario…I don't really care where it is as long as it's a

city because cities have the most opportunities. The living price is higher but more

opportunities and more stuff to do. But eventually when I get old I want to be able to

settle in a small town and be like 'I lived here, I know this place'.

<div align="right">(Youth Participant 5, personal communication, July 28, 2013)</div>

Figure 5.5: Wharf near Sable River. (Youth Participant 2).

5.4 Chapter Summary

Interview participants observed both biophysical and socio-economic change within Nova Scotia coastal communities. Biophysical change included evidence of increased storm intensity and resulting erosion, although storm frequency was not necessarily perceived to have changed. Increasing sea level rise was noticed in the frequency of wharf flooding during storm surge events, submerged buoys and higher high tide levels. Shifts in seasons and migration patterns were noticed in the ever increasing abundance of lobster landings and evidence from experimental traps that indicated lobsters were moving further offshore. Moreover, ocean temperatures were thought to be increasing based on differences in lobster shell hardness and loss of sea ice.

Although heavily impacted by a changing biophysical environment, participants tended to be more concerned with the socio-economic changes in their community. The greatest worry was declining population due to outmigration from rural communities to urban centres and to the oil and gas industry in Alberta. Resource access was limited due to increasing start up costs and daily expenses, safety issues arising from storms and fishing further offshore, and corporate monopoly on quota and licenses. Economic concerns centred on decreasing lobster prices, less income predictability due to fluctuating weather conditions and an inability to know lobster prices before leaving the wharf. As a result, communities are increasingly reliant on employment insurance benefits. Lastly, shifting governance institutions and processes around lobster grounds (traditional versus legal) and Harbour Authority management presented both challenges and

opportunities. The impact of fewer people with increasing governance responsibility (such as Harbour Authority management) has led to volunteer burnout in many communities.

Youth participants also provided insight into their perceptions of change in their communities. Observations revolved mainly around town upkeep and a lack of opportunities for youth that they perceived would be accessible in an urban setting. This led to various reflections on why youth were migrating out of rural coastal communities and why they would like to experience what it is like to live in a city. However, despite their desire to leave, all participants wanted to have the option of coming back and living in their communities if and when desired. This chapter identifies multigenerational experiences of social, economic and ecological change within the study site communities. Chapter 6 will identify evidence of socio-economic adaptive capacity and experiences of sense of place and analyze the links between these two concepts.

Chapter 6: Examples of Adaptive Capacity and Sense of Place

"Traditionally if I'm bringing lobsters home [to eat] I'll
bring them on the full moon…because they're always full,
shells are always full of lobster meat…My grandfather
taught me that."

~Phillip Stuart, West Green Harbour

The crux of this thesis suggests individual and communal sense of place is an important foundation on which socio-economic adaptive capacity can be built. Chapter 5 outlined evidence of physical and socio-economic change in coastal communities on the South Shore of Nova Scotia as perceived by participants. As described in Chapter 2 this research project looks at the idea of 'double exposures' to multiple drivers of change including climate change and socio-economic change (Leichenko & O'Brien 2008). Understanding the changes that are taking place in these communities offers important background for understanding why adaptive capacity is important. This chapter focuses on examples of adaptive capacity and sense of place as experienced by participants. It offers an explanation for how participants' sense of place influenced the socio-economic attributes of adaptive capacity they displayed. The connections drawn here are not true for all participants all of the time. Rather, they suggest one way to understand socio-economic manifestations of adaptive capacity in Nova Scotia's coastal communities.

Results for each section of this chapter are based on examples and anecdotal evidence provided by 36 interview participants associated with the fishing industry in coastal communities along Nova Scotia's South Shore as well as youth photovoice participants. I support each result with carefully chosen direct quotations exemplifying the larger story of change and adaptation as told collectively by participants. Contrasting views were identified where necessary.

As described in Chapter 2, there is a growing body of literature linking person-place bonds and socio-economic attributes of adaptive capacity (Smit & Pilifosova 2003; Armitage et al. 2007; Armitage et al. 2009; McClanahan & Cinner 2012). Physical adaptations such as improved infrastructure, emergency preparedness and gear adjustments are important strategies to mitigate risk. However, the ability to effectively adapt to change is determined by more than

simply having the resources to carry out infrastructure projects, build breakwaters and buy durable gear. Social values play an important role in determining how people understand change and are willing to adapt (O'Brien & Wolf 2010). Connections with place are one way of understanding socio-economic attributes of adaptive capacity as they affect how people understand the world and their ability to cope with change (Grothmann & Patt 2005; Fresque-Baxter & Armitage 2012).

This chapter aims to identify and analyze examples of adaptive capacity and sense of place in fulfillment of my second research objective. The chapter goes on to reveal links between these two concepts that influence the ability of individuals and communities to adapt to social, economic and ecological change. The chapter looks first at how participants build socio-economic adaptive capacity in the categories of flexibility, assets, social organization and learning. Next, it outlines experiences of sense of place as indicated by interview participants. Lastly, it combines these two concepts to highlight how elements of sense of place have influenced socio-economic attributes of adaptive capacity in this research project.

6.1 Examples of Socio-economic Adaptive Capacity

Although adaptation planning often focuses on physical adaptation, socio-economic factors exist that can enable or present barriers to the ability of individuals and communities to adapt (Smit & Plifosova 2003; Armitage 2007; McClanahan and Cinner 2012). McClanahan and Cinner (2012) identify four categories of socio-economic attributes of adaptive capacity: flexibility, assets, learning and social organization, explained in more detail in Section 2.2.2. Adaptive capacity helps communities anticipate and respond to change, minimize and recover from the consequences of change and take advantage of new opportunities (McClanahan and Cinner 2012). Increased flexibility, assets, learning and social organization improve the ability of South Shore residents to thrive amongst increasingly severe storms, rising ocean temperatures, outmigration and declining lobster prices and other challenges participants mentioned in Chapter 5. The following section details evidence of socio-economic adaptive capacity present in the interviews using the framework provided by McClanahan and Cinner (2012). As described in the conceptual framework in Section 2.5, the McClanahan and Cinner framework was chosen for its ability to comprehensively account for multiple aspects of adaptive capacity within four succinct categories.

6.1.1 Flexibility

Income flexibility involves not only diversifying income but also employing innovative and entrepreneurial strategies to improve fishing operations. Income diversification includes finding multiple sources of employment such as multiple fisheries and work outside of the fisheries sector. Innovative and entrepreneurial initiatives within the fishery can contribute to flexibility by finding more effective ways to fish or increasing the value of a product.

6.1.1.1 Income Diversification

As the groundfish industry began to decline many fishers turned to lobster as a form of supplemental income and eventually income replacement. As one fisher described, "[I used to go] longlining. Then I started going lobsterin' and I done both until the quotas come on and now I only go lobsterin' with my boat" (Fisher 5, pers. comm., May 23, 2013). The same story persisted for many fishers. Lobstering was generally perceived as less profitable and respectable than the groundfishery. This is possibly due to the lobster season lasting six months on the South Shore whereas the groundfishery was year round (see Section 4.4.1). Thus, many turned reluctantly to lobster as an alternative.

Some fishers continue to pursue groundfishing by buying quota from others to supplement their own small allotment. Alternative fisheries include halibut, row herring, longline and harpoon swordfish, as well marine plants harvesting (rock weed and Irish moss) and clam digging. Seasons for these fisheries vary throughout the lobster offseason (June-October). Marine plant and clam fisheries were seen as requiring a lot of work for little money and were practiced more by deck hands than by captains.

In addition to other fisheries, or in some cases as a replacement to fishing, some participants opened small businesses. Many of these directly supported the fishery including lobster holding facilities, boat building, stevedore work, and trap building. Other businesses were unrelated to fishing including trades like carpentry and welding, aquaculture facilities, long-haul truck driving, hunting guiding, and dog training. In some households income diversification involved a non-fishing partner seeking employment. Most often women pursue this additional income by working out of the home. Four participants reported their wives worked in jobs at the bank, grocery store, pharmacy, and ice cream shop.

Many participants commented there was a perceived lack of income options, particularly if one wanted to pursue work unrelated to the fishery. When asked what options he had if he

wanted to leave the fishery, Fisher 21 responded, "Basically nothing around here, I wouldn't know even where to go to look for a job actually" (Pers. comm., June 19, 2013). In terms of employment during the lobster offseason, one participant indicated that self-employment is a requirement, "It's hard to get jobs that will only hire you for the summer months, so you kind of have to think of something on your own to do" (Fisher 25, pers. comm., June 12, 2013). A lack of alternative options has lead to many fishers migrating to other parts of the country, particularly Alberta, to find income alternatives.

Income diversification within fisheries allows fishers flexibility to adapt to economic and resource access challenges facing the industry. As mentioned in Section 5.2.3 these challenges include product price, income predictability and reliance on employment insurance. The ability to adapt to challenges with resource access can also be improved through income diversification. This is specifically true for issues with corporate monopoly in groundfish quota and lobster license. For example, the impact of divesting a particular harbour would be lessened for deck hands if they had an opportunity to join another fishing enterprise at a different harbour. Boat captains on the other hand, would be less likely to give up their fishing business to work for someone else.

6.1.1.2   Innovation and Entrepreneurship

One fisher commented that, "The successful [fishers] are out there beating around in bad weather and they're changing bottom and they're keeping their gear [in good condition]" (Fisher 26 pers. comm., July 23, 2013). By 'changing bottom' this participant is referring to trying new trap locations rather than always returning to the same spots. Changing bottom helps fishers adapt to shifts in season and migration patterns, specifically for lobster as this species moves between inshore and offshore areas depending on ocean temperatures as mentioned in Section 5.1.3. Additionally, some fishers have tried selling lobster directly to consumers rather than to a buyer in order to deal with low prices offered by buyers for their product. While selling from the back of a truck can be more profitable it is something fishers often do not have time for when they are fishing all day during the season. It also involves finding a way to store a live product. Many fishers have adopted the practice of holding lobsters in a facility or in 'tubes' in the harbour until the price goes up, but this can be risky. As one fisher describes:

[The] last two or three years we've held them a long time but we gained. A lot of fellas sold for $3 a pound, $3 and a quarter. The first lobster we sold we got $6 for 'em. It's a gamble. It could go the other way just as well as that way.

<div align="right">(Fisher 7, pers. comm., June 14, 2013)</div>

Fish buyers dealt with market fluctuations and shifting seasons and migration patterns by diversifying the products they sold and offering value-added products. Buyer 2 started buying urchins from local harvesters and packaging elvers (small eels) as well as selling ice to fishers for offshore trips. Another buyer explains a value-added lobster product they began offering one of their corporate customers:

We take our lobsters, ship it to PEI, have it split, blanched, vacuum sealed and then we do a cruise line. That's been a big part of our business, you know we had to get into another line besides the live right.

<div align="right">(Buyer 1, pers. comm., June 28, 2013)</div>

6.1.2 Assets

Provincial and federal governments can facilitate adaptive capacity by providing access to social assistance programs that help individuals gain access to loans or employment insurance. Within the Nova Scotia fishery individuals have access to the Fisheries Loan Board and Employment Insurance Fishing Benefits. Furthermore, rural communities have a reputation of 'taking care of their own' through various means of donations and giving.

The Fisheries and Aquaculture Loan Board provides access to loans for new fishers entering the industry to purchase boats and licenses. The loan board tends to offer lower interest rates than other financial institutions. However, one participant pointed out, there are downfalls which may prompt an individual to pursue a regular bank loan, "At the Fisherman's Loan Board I would have had to put my license up for collateral, whereas at the local bank I didn't 'cause I had good standing, good credit record" (Fisher 23, pers. comm., June 7, 2013). For the majority of fishers, relying on borrowed money was a given.

However one fisher pointed out, access to borrowed money is becoming increasingly difficult:

Getting financing nowadays for a fishing outfit isn't an easy thing to do. A lot of institutions don't want to really deal with it. Because the way the whole industry's been

going the last three, four, five years, everyone's a little scared right…which does make it

tougher for someone younger trying to establish themselves in the industry.

However, a DFO-SCH Business Manager indicated borrowed money is not difficult to come by, suggesting this can actually be more of a problem than an aid as it encourages fishers to accumulate debt:

A lot of these fishermen…they don't try to pay their boat off because they upgrade their

boat every four or five years even though the other one's perfectly fine. Bigger [and]

better, and then they go into debt…Some of them are not good financial managers…The

older fishermen they shake their head and they say 'boys save for a rainy day, you don't

want to be going out spending a half million dollars on a new boat'.

Fishers also have access to federal Employment Insurance Fishing Benefits during the offseason and can keep a claim open during the regular season for times when they are not catching lobster. EI reliance was common among fishers throughout the study site, all of whom spoke openly about how and when they received it.

In addition to government assistance, rural communities have a history of providing for those in need through fundraiser benefits and personal resource sharing including money, food and other assets. Benefits include dances, silent auctions, and concerts where all proceeds go to the identified family or cause. One participant described the importance of fundraiser benefits in his community:

It's amazing the amount of money it raises every time there's a benefit dance. You go try

that in the city, have a benefit dance, see how much you raise. I think it's embedded in

our genetics to help.

The well-attended benefit concert held for families who lost loved ones in the Miss Ally disaster is one example of such a fundraiser. The purpose was to provide some financial relief, particularly to those who lost the main income earner in their family. These types of community initiatives, although not a reliable source of consistent funding, provide essential support in times of crisis or emergency. Strong community support can help families cope with unexpected economic hardship.

6.1.3 Social Organization

Examples of social organization in the interviews included collective action, information dissemination and cooperation. Collective action appeared in the form of protests against the DFO as well as collective conservation measures put in place by some fishing associations. Information dissemination about industry practices, trends and future directions was channelled through associations as well as among individuals either in person or via telephone conversations. Cooperation arose primarily at the individual harbour level in the form of collective decision-making at some but not all harbours. The formation of co-ops is another example of cooperation, although this was not a common practice in the study area. While certain examples of social organization came up in the interviews, overall cooperation within the industry was identified as a weakness. Participants expressed strong social connections among members of their communities, however, this did not appear to translate to organization at the industry level. Overall, social organization aided participants' ability to adapt to declining population levels (Section 5.2.1) and challenges with fisheries governance (Section 5.2.4).

6.1.3.1 *Collective Action*

Irish moss harvesters collectively decided to stop fishing for one week at the beginning of the 2013 season in order to improve the quality of their product and prevent overharvesting. One harvester, known in the industry as a 'mosser' explains why:

> *We decided the second week of the season just to stop going cause the moss was so short…We went for four days and could see that it wasn't that great…Friday morning a group of them kinda met and decided they didn't want to go anymore…and that was ok with me because I thought that was a smart thing to do.*

(Fisher 18, pers. comm., July 9, 2013)

A particularly positive example of organization for conservation measures within the industry came from outside the study area. Fisher 27 is involved in multiple fisheries organizations, boards and councils in Nova Scotia. He explained a project he helped initiate in Chéticamp, NS. The project involved working together within LFA 26b North to set trap reductions, increase carapace size and limit fishing days in order to protect stocks and hopefully increase prices. He describes the impetus for initiating the plan:

There was a moratorium on the groundfish, and then we quickly realized…that we had to take very great care of what we had left because we didn't want to see the same thing happen in the lobster which was our main income.

(Fisher 27, pers. comm., August 4, 2013)

The Chéticamp Management Plan, as it is called, provides a rare example of organization and collaboration within the industry. In regards to future directions for the industry Fisher 27 commented, "If we work in isolation we're not going to get anywhere, [we have to] come together as an industry within Canada to promote our lobster" (Pers. comm., August 4, 2013). Initiatives such as this help fishers adapt to the impacts of physical change by practicing conservation, as well as help build social capital to enhance cooperation and governance strategies.

Moreover, some participants had organized or joined industry wide protests in the past, particularly in response to the implementation of groundfish quotas in the early 1990's. Protests involved road blockades, picketing and even occupation of DFO offices. However, the most recent industry protests, which saw lobster fishers in other parts of the province and PEI tie up their boats in protest of low lobster prices, lacked participation from South Shore fishers. One participant explained the tension within the industry:

This summer over in PEI was terrible. They shut themselves down and protested for like a week and a half. But we kept fishing over here, we only had two weeks to go. It seemed like they wanted District 33 and 34 support on what was going on down there to fight for a better price, but here last fall basically we stood on our own with the $3 price and it wasn't a good situation for us, but we didn't have a whole lot of support from the other end.

(Fisher 19, pers. comm., June, 15, 2013)

6.1.3.2 *Information Dissemination*

According to participants, fishing associations are the most common avenue for governments and external organizations to communicate with fishers. Associations are generally organized around gear type (fixed or mobile) or species (lobster, groundfish, halibut, swordfish etc.). Each region elects a member to represent them in the association for their specific fishery. However, not all associations represent clearly defined groups. For example, disagreements between fishers were cited as the reason for forming two groundfishing associations in Shelburne

County. Fisher 20, a fisher from Queen's County explains the tension among fishers, "…the reason there's two groups is because they could not get together as one group. You had the people that caught fish and the people that didn't" (Pers. comm., June 11, 2013). In referring to 'the people that caught fish and the people that didn't' he is referring to people who held licenses and used them versus those who held a license but did not fish it themselves.

Despite some degree of organization at the association level, information is disseminated more commonly through unofficial interactions among fishers. When asked how he finds out about different meetings or the results of certain decisions, one participant responded:

> *Through just word of mouth, around the wharf, or somebody would make a phone call and say 'could you pass the message on' type thing. Amazingly word of mouth gets around very fast right (laughs), like around these communities, when I'm lobstering I'm out here, I'm three hours off but I pretty much know what's going on in Yarmouth right.*
>
> (Fisher 23, pers. comm., June 7, 2013)

Fishers frequently referred to other fishers as their primary sources of information. Multiple participants described going to the wharf daily, even during the offseason, to talk with others. While some indicated 'wharf talk' was not the most reliable source of truthful information, it's importance in forming perceptions and establishing common narratives about challenges and adaptation options cannot be overemphasized. Having multiple communication channels for information dissemination amongst industry members can improve social organization and knowledge of what is happening in the industry.

6.1.3.3   Cooperation

Despite some examples of positive collective action, multiple participants commented on how difficult it is to get fishers to cooperate and organize as an entire industry. "Fishermen here won't stick together enough. That's one of the biggest problems that we've had all down through history" (Fisher 16, pers. comm., July 8, 2013). Another fisher added, "Fishermen like to disagree with one another, and [then] you don't get anything [from the government]" (Fisher 9, pers. comm., June 7, 2013). It appears other than their distaste for DFO regulations there are few things members of the entire industry are willing to cooperate on. Outside of the study area some harbour authorities, such as Lower West Pubnico and multiple locations in PEI, have opted to form fishing co-ops which allow them to sell their catch collectively, save money by making bulk gear purchases, and benefit at the end of the year from dividend payouts. Co-ops are

popular throughout other regions of Nova Scotia and the Maritimes, but there were no reported co-operatives within the study site. A lack of cooperation negatively impacts adaptive capacity by limiting social organization to deal with pressing challenges. Issues such as corporate monopolization of licenses, harbour divestment and Harbour Authority management could particularly benefit from improved industry cooperation as adapting to these challenges dealing with well-organized government and corporate entities.

6.1.4   Learning

As mentioned at the beginning of Section 6.1, learning involves the ability to recognize and identify causes of change (McClanahan & Cinner 2012). Many participants identified various causes of the environmental, social and economic changes noted throughout Chapter 5. The way participants reported learning about these cause and effect relationships can be separated into two categories: personal experience and exposure to scientific research. Personal experience included longitudinal observation, possible as the result of extended residence in a place, as well as the act of comparing events and conditions between regions to understand the scale and diversity of change. Scientific learning occurred through formal education and through interaction between fishers and scientists at multi-stakeholder events such as conferences, meetings and fisher participation in scientific surveys. However, perceptions of the causes of environmental change in particular varied amongst individuals. Some participants exhibited a lack of understanding about climate change, assuming it meant warm temperatures all the time, "As far as this global warming, we were still getting frost in the last of May…So it doesn't look to me like global warming" (Fisher 11, pers. comm., June 20, 2013). Some attributed observed change to natural cycles, "The year before last we had a good winter, last year was a poor winter, so she cycles like that" (Fisher 15, pers. comm., July 12, 2013). Others were beginning to attribute observed environmental change to the impacts of climate change:

> *I don't know what's going on. I do believe that this year there is something to the global warming. A lot of people don't, but I do believe that there's something to that 'cause I know that the tides are coming higher…than they ever did.*

<div align="right">(Fisher 14, pers. comm., June 21, 2013)</div>

Another indicated, "The tides do come higher…and sometimes they go further and I think personally that's to do with global warming, but I might be wrong on that" (Fisher 23, pers.

comm., June 7, 2013). While still others were more confident human impacts were the root cause, stating, "we're destroying this poor ol' earth, we know that" (Fisher 1, pers. comm., July 23, 2013), and, "Global warming is playing hell onto us, we're seeing temperatures we've never seen before" (Buyer 1, pers. comm., June 28, 2013). In talking about the future of the industry the fisher who initiated the Chéticamp Management Plan went beyond speculating whether or not climate change exists going as far as to say, "We're going to have to adapt as we evolve with climate change" (Fisher 27, pers. comm., August 4, 2013). Multiple learning experiences and exposures to scientific information have lead to the varying perceptions of humans as causal agents of the physical changes reported in Section 5.1.

6.1.4.1 Experiential Learning

Fishers tended to acquire pertinent information about change through their own personal experiences and those of others. Most participants had lived in the same location for multiple decades. Many of them have been fishing from the same harbours their fathers and grandfathers had fished from. Long-term experience in one location provides a unique vantage point to observe longitudinal change. Frequently participants compared today's conditions with those during childhood. One Participant 16's wife noted:

> *When I was a little girl going to school I walked across the beach and we played hide and seek behind the ice cakes. The harbour would freeze and when the tide went in or out the ice cakes would be landed on the beach, they'd be like this high, you'd be climbing mountains going to school…I don't remember the last time it froze over.*

> (Pers. comm., July 8, 2013)

In addition to comparing past and present environmental conditions, fishers frequently compared conditions across different regions. These informal knowledge sharing sessions often take place at the wharf, on the telephone, or during personal visits to one another's homes. One fisher mentioned, "when I come home at night...from 9pm to 10pm I'm on the phone pretty much constantly right…amazingly word of mouth gets around very fast right [in] these communities" (Fisher 23, pers. comm., June 7, 2013). The same participant described how his Sunday routine puts him in contact with fishers from a different part of the province:

> *Paula and I…go for a Sunday drive around Cape Sable Island, I guess we've always done that. Just looking at different boats or whatever, talk[ing] to people, see[ing] what*

they're doing different. I'm trying to get information from them (laughs)...you're always in contact with people.

<div align="right">(Fisher 23 , pers. comm., June 7, 2013)</div>

Another fisher described how he learned about the quality of lobsters being caught in Maine:

> *[I] talk[ed] to a guy...he was here in a sailboat and the sailboat broke down and he happened to tie along side of my lobster boat...He said about how in Maine...they catch what we consider to be a terrible quality lobster 'cause they get shedders and there's no meat in them.*

<div align="right">(Fisher 18, pers. comm., July 9, 2013)</div>

Not all conversations revolved around direct observations of environmental change. Discussions also include community information and changes to government policy and regulation. However, these interactions exemplify how fishers exchange information about their experiences and observations. Some of the younger fishers also mentioned using social media sites such as Facebook to communicate with others in the industry. However, most older fishers preferred in-person forms of communication indicating they did not know how to operate a computer.

6.1.4.2   Scientific Learning

While experience can help make the link between human activity and environmental change, formal education and interactions between fishers and scientists were raised as another means to this end. Formal education levels within the industry tend to be quite low. Of the twenty-seven fishers interviewed, twelve indicated they did not finish high school and seven did not indicate their education level. A harbour supervisor described how low education levels affect Harbour Authority meetings:

> *When I have board of director meetings and I've got packages for them and [they say] 'I forgot my glasses',well I know they just can't read it. And they're smart men, they run a business...But they dropped out of school.*

<div align="right">(Harbour Supervisor 2, pers. comm., June 10, 2013).</div>

Despite low levels of formal education however, some fishers receive a crash course in scientific methods and theory by participating in events such as conferences and fish surveys. The Lobster Council of Canada and the former Fisheries Resource Conservation Council are two examples of

multi-stakeholder networks participants were involved in. One participant described his experience interacting with academics at multi-stakeholder events:

> *I basically got a very intensive education because I used to sit with biologists and ask questions. What about this and what about this and what about this. After a while I got very comfortable with scientific lingo and how they operated…So pretty well you might say self-taught. I didn't go to university.*

<div align="right">(Participant 27, pers. comm., August 4, 2013)</div>

Three fishers had been involved in scientific surveys designed to monitor species health and population statistics. Often government will assign the task of catching the fish used in these studies to fishers who are compensated in dollar amounts or increased fish quotas. In one case fishers approached academics about starting a survey for a particular species in the hopes that the scientific information they collected would eventually result in relaxed regulations. Admittedly not all multi-stakeholder networks are inclusive and operate smoothly. One participant remarked on inequality in terms of who participated in the surveys, "People that's got money and they buy fish, they get the surveys, it's all money" (Fisher 15, pers. comm., July 12, 2013). Those that were involved in multi-stakeholder initiatives commented they found many barriers in communicating with academics. As one participant humorously noted:

> *Science use[s] acronyms for everything! And you don't know what the hell they are. So you either have to stand up and say 'what does that mean?' and they're looking at you like 'what kinda dummy are you?'…I honestly think they spend millions of dollars coming up with a phrase that they can make an acronym out of that makes a word.*

<div align="right">(Fisher 2, pers. comm., July 3, 2013)</div>

In addition to participating in scientific surveys, fishers in Port Mouton implemented their own scientific research to show the impacts of fish farms on lobster catches. Fishers noticed drastic decreases in lobster catches after the opening of a finfish aquaculture cite in 1995 (Loucks, Smith & Fisher 2014). They proceeded to record their catches per trap during the last two weeks of May (traditionally the most abundant catches of the season) for seven years. Results from fisher's research have been published in a peer-reviewed scientific journal (Loucks, Smith & Fisher 2014).

6.2 Experiences of Sense of Place

Experiences of sense of place varied from individual to individual and community-to-community. As outlined in the conceptual framework for this thesis (Section 2.5), I use fourteen attributes of sense of place based on Fresque-Baxter and Armitage (2012) in order to categorize results for this section. These attributes are: 1) emotional attachment; 2) environmental skills; 3) self-esteem; 4) self-efficacy; 5) continuity; 6) uniqueness; 7) security; 8) sense of belonging; 9) rootedness; 10) familiarity; 11) social connections; 12) commitment to place; 13) aesthetic value; and 14) labour contribution. Working definitions for each of these fourteen attributes can be found in Appendix A. Results for each category are provided in the form of direct quotations throughout this section. Youth participants did not touch on all elements of sense of place. However, the youth participants did mention several of the primary categories, including evidence of emotional attachment, environmental skills, the importance of security and social connections, commitment to place and valuing aesthetics. These themes arose as participants described their photos of places that are important to them, and places where they'd like to see change in their communities. Results from the photovoice project are integrated into this section accordingly.

Table 6.1: Summary of sense of place attributes expressed by interview participants.

Attribute of Sense of Place	Examples from the Interviews
1) Emotional Attachment	- Positive memories in a family home - Positive memories of childhood - Memories helping father fish
2) Environmental Skills	- Marine navigation - Best location to place traps - Fishing mackerel as children
3) Self-esteem	- Pride in fishing business - Negative with decline in fishery and socio-economic conditions
4) Self-efficacy	- Accomplishment from hauling traps - Boat ownership
5) Continuity	- Occupational continuity (multigenerational fishers) - Declining as fewer young people get involved in the fishery
6) Distinctiveness/Uniqueness	- Having 'the best life' - Being seen as a tourist destination

7) Security	- Difficulty selling licenses - Declining food security with decline in fishery - Physical security in small towns - Emotional security derived from peaceful places
8) Sense of Belonging	- 'Come from away' used to identify outsiders in the community - Idea of a 'real fisherman'
9) Rootedness	- Identity derived from which wharf you fish from - Multigenerational rootedness in a community - Homesickness
10) Familiarity	- Being known at the wharf
11) Social Connections	- Interactions at the wharf - Meeting places for youth
12) Commitment to Place	- Desire to remain in a place - Commitment to fishing, unwillingness to retire - Long term conservation measures - Desire to be able to return to one's hometown later in life
13) Aesthetic/Experiential Value	- Peacefulness - Beauty of the harbour - Town upkeep could be improved
14) Labour Contribution	- Volunteer fire department - Ladies auxiliary - Community groups - Physical labour leveraged to get new skidway

6.2.1   Emotional Attachment

Emotional attachment refers to bonding between people and a physical place or social milieu according to Fresque-baxter and Armitage (2012). Emotional attachment can be expressed through positive memories of a place. Memories develop over time spent in a place. Queens and Shelburne, the two counties within the study site, have 91% and 93% of their population as third generation or more Canadian (Statistics Canada 2011b). Judging from conversations with participants many of these are also third generation or more from the area. For example, one fisher expressed emotional attachment to his property based on the positive memories he has of his first few years living with his wife in a small shed while he built their current home:

> *I bought the land from my uncle. And this building here (bait shed)...was up in the yard*
>
> *where our house is and that's where we lived until I got the house done and then I moved it*
>
> *down here...I built it, well with help from family and stuff...over here was an oil stove,*
>
> *that's what we used for heat and then we had a little electric stove woulda probably sat*

*right there somewhere. Course it was clean and neat and freshly painted and she kept it
good!...We was newly married and in love at that time. Everybody says...'You musta been
roughin it', but it was good.*

<div align="right">(Fisher 17, pers. comm., June 25, 2013)</div>

Youth participants expressed multiple examples of emotional attachment within the
photos they took for the photovoice project. Youth Participant 4 associated positive memories
with places associated with the fishery. His photo (Figure 6.1) depicts one such sentimental
memory:

*This is the spot, like when my dad went lobster fishing we'd go right quick to here and
watch dad go in and out and all the other fishermen...We'd take binoculars and go to the
very point of it and you could see his boat go.*

<div align="right">(Youth Participant 4, pers. comm. July 29, 2013)</div>

This participant also recalled memories of helping his father at the wharf indicating an
attachment to the fishing heritage in his community:

*I'd always go with dad and pull lines cause at the end of the year they've got mossy and
stuff so they would have to bleach them and clean the lines and stretch them out. Ever
since I could walk I'd walk out the rope, so ever since I can remember, I was helping
dad.*

<div align="right">(Youth Participant 4, pers. comm. July 29, 2013)</div>

Figure 6.1: The viewpoint in Lockeport, NS. (Youth Participant 4).

6.2.2   Environmental skills

Environmental skills develop as a person learns how to use the surrounding environment to provide for their physical, mental and spiritual needs (Fresque-Baxter & Armitage 2012). As an industry fishing is highly conducive to the development of environmental skills. The ability to catch fish, navigating a boat, and knowing where to place lobster traps or fishing lines are examples of skills participants possessed. Environmental skills were acquired in a variety of ways, however 24/27 fishers interviewed came from families where their fathers and/or grandfathers had been fishers. Only three participants were the first generation of their families to fish. Learning how to fish from a family member involves the transfer of environmental skills from one generation to the next. Navigation was identified as a particularly important environmental skill for safety, however it is a skill that is slowly being lost due to modern Global Positioning System (GPS) technology. As one fisher noted:

> *"I do know how to navigate without all that fancy equipment, that if everything blew off the boat I could get back with a compass just like they did a hundred years ago. I can get my sounder laid out, I can sound out the bottom, I can figure out where I am, I can get the boat back in. There's not a lot of people can do that anymore."*

(Fisher 4, pers. comm., July 17, 2013)

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Two youth participants spoke about environmental skills in reference to fishing for mackerel near their homes. One participant described this as an activity he partook in regularly when he went to the wharf, "I go there if I want to take a fishing rod and just sit down. I fish for whatever to just get outside and do something" (Youth Participant 4, pers. comm., July 29, 2013).

6.2.3 Self-esteem

Self-esteem is an individual's opinion of his or her own self worth. Self-esteem can be derived from belonging within a particular place (Fresque-Baxter & Armitage 2012). Fishers often associated self-esteem with a sense of pride in their fishing business:

> *"Most fishermen are very independent people and they're not people who would be good on an assembly line or something like that, they couldn't stand it, they want to do their own thing and they're their own bosses and they take pride in that."*
>
> (Fisher 26, pers. comm., July 23, 2013)

However, the decline of the groundfishery and the subsequent transition to a six-month lobster season had a negative impact on many participants' self-esteem. Declining socio-economic conditions, particularly in areas that used to be largely self-sufficient affected some individuals' identity as successful fishers. As one fisher explained:

> *We was 12 months of the year fishermen, and now we're 6…months of the year… And the people that is stayin' [here], I don't know, I guess we're stupid because really it's not very smart to live around here anymore. You got no quality of life cause you've never got any money to spend.*
>
> (Fisher 16, pers. comm., July 8, 2013)

6.2.4 Self-efficacy

Self-efficacy is the feeling that one is capable of accomplishing their goals. A place that fulfills an individual's needs and helps them reach their goals can contribute to self-efficacy (Fresque-Baxter & Armitage 2012). One lobster fisher expressed, "You have a feeling of accomplishment by catching lobsters, it's just a way of life right, the weather, yes it makes you cranky at times but that's not the main part of it" (Fisher 10, pers. comm., June 28, 2013). Fisher 10 derives self-efficacy from the sense of accomplishment he feels catching lobsters, a feeling that is more important to him than the bad weather he often has to face in order to get out to his traps. In addition to self-efficacy derived from catching fish, boat ownership was a source of

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pride and proof that they could accomplish the goals they pursued. Fisher 12 describes owning his first boat, "I was probably 16, 17 years old when I got my first boat…I was captain of my own boat" (Pers. comm., June 18, 2013). Four fishers talked about the freedom of 'being their own boss' and having the ability to set their own goals and be responsible for their own success or failure.

6.2.5   Continuity

Armitage and Fresque-Baxter (2012) write about continuity of both the characteristics of a place and identity derived from a place. Considering that over 90% of people in the study site are third generation or more Canadian (Statistics Canada 2011b), and likely many of those have a multigenerational family history in the area they currently live, place continuity was a common topic of conversation. As mentioned in Section 6.2.2 above 24/27 fishers came from fishing families. This continuity of occupation was a strong source of identity for many participants. As one fisher explains,

> I got into fishing 'cause four generations before me were into fishing. My great grandfather was a fisherman, my grandfather was a fisherman, my father's a fisherman, his two brothers are fishermen and I'm a fisherman and my two brothers are fishermen, and so we just grew up with it.

(Fisher 17, pers. comm., June 25, 2013)

Although many fishing operations are multigenerational, many fishers are faced with the reality that they will likely be the last generation of their families to fish due to different priorities for most young people. Fisher 7 was 91 years old at the time of the interview and described the bleak future of his fishing business, "Well I'd like to see someone carry it on, but that'll be the end of it when my boy's done with it, of our family in fishing, that'll be the last one" (Pers. comm., June 14, 2013). Not all fishers faced with this reality were concerned about the potential lack of continuity in the fishery however, recognizing the importance of education and opportunities their children have that were not available to them. "I don't want my son fishing. I've only got the one son and I don't want him fishing," explained Fisher 5 (Pers. comm., May 23, 2013).

6.2.6   Distinctiveness/Uniqueness

Understanding a place as unique or special and considering oneself as belonging within

this unique place can contribute to sense of place. Place can be an important part of self-identity and used as a way to distinguish oneself from others (Fresque-Baxter & Armitage 2012). Within the fishing industry this unique identity often comes less from place and more from lifestyle. As Fisher 2 stated, "We have the best life there ever was." (Pers. comm., July 23, 2013). Uniqueness is generally the focus of tourism strategies. The One Nova Scotia report recognizes the unique inshore fishery as a draw for tourists who like to make connections between food and food producers (Nova Scotia Coalition on Building Our New Economy 2014). Fisher 19 describes his harbour in Hunt's Point as drawing tourists because of its uniqueness, indicating a sense of pride in belonging to such a harbour:

> *Tourists when they drive along and they see these little ports with the boats, it's an*
> *automatic draw because that's what they come here for is to go see them little places.*
> *And they just go down and soak it up, take pictures, because it's different.*
>
> (Fisher 19, pers. comm., June 15, 2013)

6.2.7   Security

Security refers to feeling safe physically, psychologically and/or emotionally (Fresque-Baxter & Armitage 2012). Economic security is part of this definition and certainly a common cause of insecurity in rural coastal communities in Nova Scotia. Partially due to a trend of young people moving away from rural communities, many fishers and small business owners were concerned about future financial security. Fishers referred to their licenses and boats as their 'retirement package', however cashing in on this retirement package requires someone to buy it. Fisher 26 lobster fishes and owns a boat repair shop owner indicated a poor chance of being able to sell his business when he decides to retire, "Even if I wanted to sell out now I can't because who's going to buy it? Who wants a boat shop? It's not something I could sell very easily" (Pers. comm., July 23, 2013).

In addition to financial security, one participant raised food security as an important issue. Fisher 16 indicated collecting and sharing food within a community is a thing of the past due to privatization of the fishing industry and increasingly stringent catch regulations:

> *[In the past] if I was fishing swordfish I'd give swordfish to all my friends. And then*
> *when my friend was goin' halibutin' he'd give me halibut or cod…in these small*
> *communities you kinda took care of each other…[but now you] aren't allowed to use*

any natural resource to feed yourself.

<div align="right">(Fisher 16, pers. comm., July 8, 2013)</div>

Youth participants talked about the physical security they experienced in their small communities both individually and in the youth focus group discussion. One youth participant recalled, "I just like that it's safe…also like you can just walk around town, walk around the streets" (Youth Participant 4. Pers. comm. July 29, 2013). While the same participant complained that living in a small town means "Everyone knows everyone and everyone's in your business," another jokingly pointed out, "Sometimes you're like 'you're always in my business!' and other times you're like 'well, [at least] I'm not going to get abducted" (Youth Participant 5, pers. comm., July 29, 2013). An element of security that youth participants brought up that was not as obvious in interviews with fishing industry participants was the issue of emotional security, and having a place that was comforting or soothing. One participant described how he felt coming home for the summer after having moved to the city for school, "I was glad to be home because all the comforts of home are here" (Youth Participant 2, pers. comm., July 30, 2013). Another indicated the importance of a particular place under a bridge near his home (see Figure 6.2) that served as a comforting place when emotions were running high:

> *If I was in a fight or something was wrong at home I'd come here and chill and relax and just think about stuff. And just the nature and everything…So this is just a spot where I come to cool down and just think about stuff.*

<div align="right">(Youth Participant 4, pers. comm., July 29, 2013)</div>

Figure 6.2: A quiet place for reflecting and drawing emotional strength. Under a bridge near Lockeport, NS. (Youth Participant 4).

6.2.8 Sense of Belonging

A sense of belonging refers to the feeling that someone belongs in a place (Fresque-Baxter & Armitage 2012). Relph's (1976) concept of 'existential insideness' or being an unconscious insider is a strong form of a sense of belonging. As mentioned in Section 2.3.2 belonging can also lead to exclusionary boundaries distinguishing insiders from outsiders (Cresswell 2004). In Nova Scotia the term 'come from away' is regularly used to describe people who are not local. However, upon prompting some participants to comment on who qualifies as 'from away' I discovered the boundary lines are not particularly clear. Some said people from anywhere outside their immediate community were 'from away', others indicated the term was reserved for those from outside of Nova Scotia, and still others implied one had to have a multigenerational history in a place to be considered a true insider. This lack of consensus indicates different individuals draw insider/outsider boundaries differently. Many participants were quick to identify outsiders within the fishery due in part to the competitiveness of the industry. Phrases such as 'real fishermen' and 'right to fish' were frequently used. Although again, different people had different definitions of what gives someone the 'right to fish' the use of these terms indicates a sense of belonging often comes at the expense of excluding someone else. Fisher 4 is a successful fisher in his community, however he does not have family heritage in the fishery and attributed this 'outsideness' to a sense that people in the community did not initially support him buying a license:

I think it's the fact that we're not right from here because that exists a lot in the fishery,
and this is right in this community. People that have been here for years are the locals.
And anybody that comes from somewhere else is outsiders. Well dad was a lighthouse
keeper…I'm gonna say 50% of the fishermen was very resentful that we started in
fishing.

<div align="right">(Fisher 4, pers. comm., July 17, 2013)</div>

This raises the issue of who determines whether someone belongs in a place. Fisher 2, a longline and lobster fisher explained the tension he faced at the wharf because although he paid his moorage fees, he did not live in the same community his wharf was located in. Humorously he explains:

So in the Harbour Authority context if you tie your boat to that wharf, [I believe] you're
part of that community. But if you happen to live in Gunning Cove some of them think
they have priority, because they live there, [otherwise] you're an outsider. But they've
been straightened out on that. I can assure you I am a part of the community.

<div align="right">(Fisher 2, pers. comm., July 3, 2013)</div>

6.2.9   Rootedness

Fresque-Baxter and Armitage describe rootedness as "an unselfconscious state of being at home in a place" (p.255). As described in Section 2.4 rootedness often results in long habitation in one place and can lead to either an unwillingness to change or a unique vantage point to see the impacts of change over a long time scale. Within coastal communities, harbours can be a source of history, identity and rootedness. Harbour Supervisor 4 explains the challenges with amalgamating small harbours:

We have small adjacent harbours which would be better served by moving those vessels
to a central harbour. The problems that you run into there are community based
problems and that is a sense of history. 'My grandfather used this wharf, my great
grandfather used this wharf and probably Noah tied the arc to this wharf and so I'm
going to use this wharf'…'this is the village wharf, it has been here forever, I'm not
going to another village, I have the right to fish out of here'…it's based on history, it's
based on a nuclear type of thinking, like 'this is my village and this is where I'm going to

fish forever'.

Rootedness is also a revealing topic in the context of outmigration. Population decline remains an ongoing issue in the Maritime Provinces as described in Section 4.3. However, as Fisher 25 put it, "Me personally, I wouldn't be able to leave because I would be so homesick." (Pers. comm., June 12, 2013). A response such as this indicates a deep rootedness to her hometown and an inability to imagine living a different way. This can have both positive and negative impacts on adaptive capacity as will be explored in the following section.

6.2.10 Familiarity

Familiarity refers to the experience of "knowing and being known" in a place (Fresque-Baxter & Armitage 2012). Familiarity can be closely associated with developing a sense of belonging. As social hubs in coastal communities, harbours and wharves often play an important role in developing a sense of familiarity within a community from a young age. Harbour Supervisor 4 describes the social climate at the wharf where she works:

Wharves in your small coastal villages like this are important in many ways…Two of our seniors, they're just lovely lovely men, they'll work on their little make and break [engines] and they're…down at the wharf like all summer, and everybody stops to talk and…they've been going since they were 7 or 8 and they're still there and they're still enjoying it and it's still a place to meet folks and just belong, a place that you belong, and that's what the wharves offer in our little communities.

(Harbour Supervisor 4, pers. comm., June 5, 2013)

6.2.11 Social Connections

Social connections allow individuals to 'know and be known' in a community. Activities and events that happen in a place work to strengthen social connections and in turn community ties (Fresque-baxter & Armitage 2012). Throughout the interviews wharves consistently came up as important places in coastal communities for social connections. Fisher 23 compares his visits to the wharf with what some people experience going to a coffee shop:

Some people go to the coffee shop and have their coffee and conversation, other people would go to the wharf. And kinda just gossip, what are you doing today or whatever, so

that kinda thing. [Even] days I don't go lobstering I'm still at the wharf in the morning.

(Fisher 23, pers. comm., June 7, 2013)

Harbour Supervisor 4 acknowledged, "There's a lot more to [wharves] than the lumber and timber…There's a huge social aspect that is related more to the community and the fabric of the community rather than specific to the industry" (Pers. comm., June 5, 2013).

Connections with friends or family were the focus of the majority of conversations with youth. All participants valued places where they spent time with people. Two participants mentioned a grassy, treed area (Figure 6.3) where they spent time with friends, "It's a place that my four or five friends and I go sometimes. They're just like 'hey we're down at the spot come join us!'" (Youth Participant 3, pers. comm., July 25, 2013). Another showed a field behind his house (Figure 6.4) describing how, "Sometimes friends will come down, family friends and we just go on the hill and we have a good time, walk and talk and have campfires and what not" (Youth Participant 2, pers. comm., July 30, 2013). Beach access was also important for social interactions (Figure 6.5), "I always liked to go there just to chill, relax hang out with friends" (Youth Participant 4, pers. comm., July 29, 2013). While all participants talked extensively about the importance of places where they connect with friends and family, there was also a consensus that they did not have enough of these places available. Interestingly, while all the places they mentioned currently spending time with others were outdoor, natural areas, they universally agreed that they would like to have access to a shopping mall where they could meet friends. A mall was particularly important for those who were not yet old enough to drive.

Figure 6.3: The spot. A place where friends gather. (Youth Participant 3).

Figure 6.4: Field overlooking the harbour. (Youth Participant 2).

Figure 6.5: Crescent Beach in Lockeport. A place to hang out with friends. (Youth Participant 4).

6.2.12 Commitment to Place

Commitment to place can be shown through a desire to stay in a place and being willing to take action to protect a place (Fresque-Baxter & Armitage 2012). Questions about where people saw themselves living and what they saw themselves doing in the future were designed to draw out experiences of commitment to place. As Fisher 3 bluntly put it, "I love this area and I love fishing and I hope I don't have to go out west" (Pers. comm., June 27, 2013). When asked 'how long will you continue fishing?' participants responded with answers such as "'Til I can't walk" (Fisher 11, pers. comm., June 20, 2013); "When they ice me aboard the boat in a bucket then I'll have to quit I guess" (Fisher 26, pers. comm., July 23, 2013); and "Fishermen don't retire, they die" (Fisher 2, pers. comm., July 3, 2013). Such responses indicate a commitment not just to the physical place they live but to the lifestyle they live within a place.

Conservation measures put in place to protect the fishery for use by future generations can also indicate a sense of place. Examples of conservation measures include temporary reduced harvesting by Irish Moss harvesters and voluntary trap reductions by fishers in LFA 26b North on Cape Breton Island. Fisher 27 indicated the conservation measures were put in place not for the benefit of current fishers but for future generations:

> *[The younger generation], they're gonna gain the best part of what we're doing. 'Cause I got about 5-10 years max left. [The lobsters] I dropped last year, they were very small, they're gonna come into the fishery in about 8, 9 years…I'll be done by then. So it's actually to [younger fisher's] benefit what I'm doing more so than me.*
>
> (Fisher 27, pers. comm., August 24, 2013)

Keeping the well-being of future generations in mind when developing current fisheries management strategies indicates a strong commitment to place. The desire to see one's descendants continue to derive a sense of place from the same place you have shows long-term thinking and deep-rooted commitment.

Contrary to most adult participants, all youth participants indicated their desire to leave their towns and live elsewhere for part of their lives. However, they also all mentioned it would be difficult to leave, and some indicated they would like to have the option to return at some point. Desire to be able to return to their hometowns was expressed most strongly by the two participants who came from fishing families. However, their commitment was not specifically to becoming fishers themselves. One of these participants was warned by his father against

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becoming a fisher, as mentioned in Section 5.3.3. The other was considering a career as a fisheries officer. His reason for wanting to pursue this career indicated a strong commitment to both the fishing industry and broader ecological system, "I'm a nature person so I like to keep the oceans clean and the rules and regulations so people don't overfish and ruin the fishing industry here" (Youth Participant 4, pers. comm., July 28, 2013).

6.2.13 Aesthetic/Experiential Value

Aesthetic value comes from personal appreciation for the beauty and qualities of a place (Fresque-Baxter & Armitage 2012). Often participants expressed this attribute through appreciation for the physical beauty of the place they lived. Many also indicated the sense of peace and calmness they experience either while fishing or in particularly sentimental places on shore. In describing why he likes living in Shelburne, Harbour Supervisor 1 expressed, "You just sit back, relax, take in the scenery, it's peace…if you wanted to sit down on the shore you can sit down on the waterfront, it's peaceful" (Pers. comm., May 23, 2013). In a sentimental description of why he finds the harbour beautiful, Fisher 5 described:

> *I went in and outta this harbour for close to 20 years and didn't realize how nice the harbour was 'til I started my tour business…in December… you go up the middle of the harbour and all the Christmas lights are on the houses… Holy geez, ya talk about nice! I guess you don't know what you got until you open up your eyes and look around and see what you do have.*

(Fisher 5, pers. comm., May 23, 2013)

Aesthetics added important value to many of the places youth identified as important in their photos. In regards to the Town of Shelburne, Youth Participant 1 commented, "I like that it's quiet and I feel safe here. And it's really pretty" (Pers. comm., July 27, 2013). All participants talked about wanting to see their towns better maintained as mentioned in section 5.3.1, and valuing the beauty and function of the town. Two participants talked about unused or underused spaces in Shelburne where they would like to see improvements. These areas included an open field, a skate park and a vacant lot, a wharf and the trestle bridge in Lockeport, as well as maintenance to the viewpoint shown in Figure 6.1. One participant described the deteriorating aesthetics of a building at the main intersection of his community, "Before it was like a fast food diner restaurant...And now it's just an empty space" (Youth Participant 2, pers. comm., July 29,

2013). Focus group conversation indicated participants in all three communities felt their towns looked run down and could benefit from more maintenance and upkeep to look better.

6.2.14 Labour Contribution

Although not included in Fresque-Baxter and Armitage's framework for understanding sense of place, labour contribution is an important attribute of sense of place as described in Section 2.5. Labour contribution refers to contributing time or physical labour to build or modify a place or a community. Fifteen out of 36 participants made reference to some form of labour contribution either within their fishing business or their community. Four participants indicated they built their own lobster traps, which included the tremendous effort of cutting the wood and knitting the mesh trap heads. Involvement in community organizations such as the local volunteer fire department, ladies auxiliary, youth clubs, and school boards were mentioned. Fisher 25 described how she spends the six months when she is not working on her father's lobster boat:

> *I work a lot with the different rescue groups for animals around here, so that takes up most of my day and I love doing stuff like that. The fire department, like the women's auxiliar. So it's not just lobstering, there's a lot to the community.*

(Fisher 25, pers. comm., June 12, 2013)

Another example of labour contribution came from the fishers at the West Berlin wharf. The Harbour Authority offered their physical labour as an incentive to get funding to build a new skidway for hauling their boats out of the water, "Small Craft Harbours paid for the skidway but we built the pier. We actually bought the material and actually physically built the pier as part of our contribution to that job" (Fisher 21, pers. comm. June 19, 2013). Willingness to contribute time and energy to improve fishing infrastructure or contribute to essential community services indicates a strong sense of place and ability to think communally. In the case of the West Berlin wharf, physically contributing to building the structure increased fishers' personal investment and provided a sense of ownership toward the harbour. One SCH business manager explained that getting fishers to contribute time and labour was ideal not just for saving money, "They're going to really take ownership of it, they're responsible for the maintenance and stuff, so…you try to get them to contribute if they [can]" (DFO-SCH 2, pers. comm., June 22, 2013).

This section highlighted examples of each attribute of sense of place that arose throughout the interviews. This list is by no means exhaustive and merely represents my interpretation and classification of others' profoundly personal experiences. However, understanding adaptive capacity through the lens of sense of place requires first attempting to understand how participants in my case study form person-place bonds. This section aims to clarify some of the complexities of the sense of place concept.

6.3   Linking Sense of Place, Adaptive Capacity and Adaptation

Figure 6.6 visualizes the connections between sense of place and adaptive capacity. As mentioned in the beginning of this thesis, sense of place is only one lens through which to look at and understand adaptive capacity. The connecting lines between Subdimensions of Social Attributes of Adaptive Capacity (middle column) and Elements of Sense of Place (last column) are based on examples or insights drawn from interview conversations and presented in Sections 6.1 and 6.2. These connections are not always unidirectional. Elements of sense of place can inform adaptive capacity and in some instances the specific adaptation decisions chosen by an individual or community can in turn influence sense of place. For example, a sense of belonging to a community of fishers was identified as affecting one's choice to pursue other fisheries for income diversification. However, the act of participating in an alternative fishery, may in itself serve to expand or reinforce one's sense of belonging to a community of fishers. While there are many possible interactions between sense of place and adaptive capacity, this research project focuses primarily on the ways sense of place influences adaptive capacity. The following section outlines each of the connecting lines in Figure 6.6 in more detail.
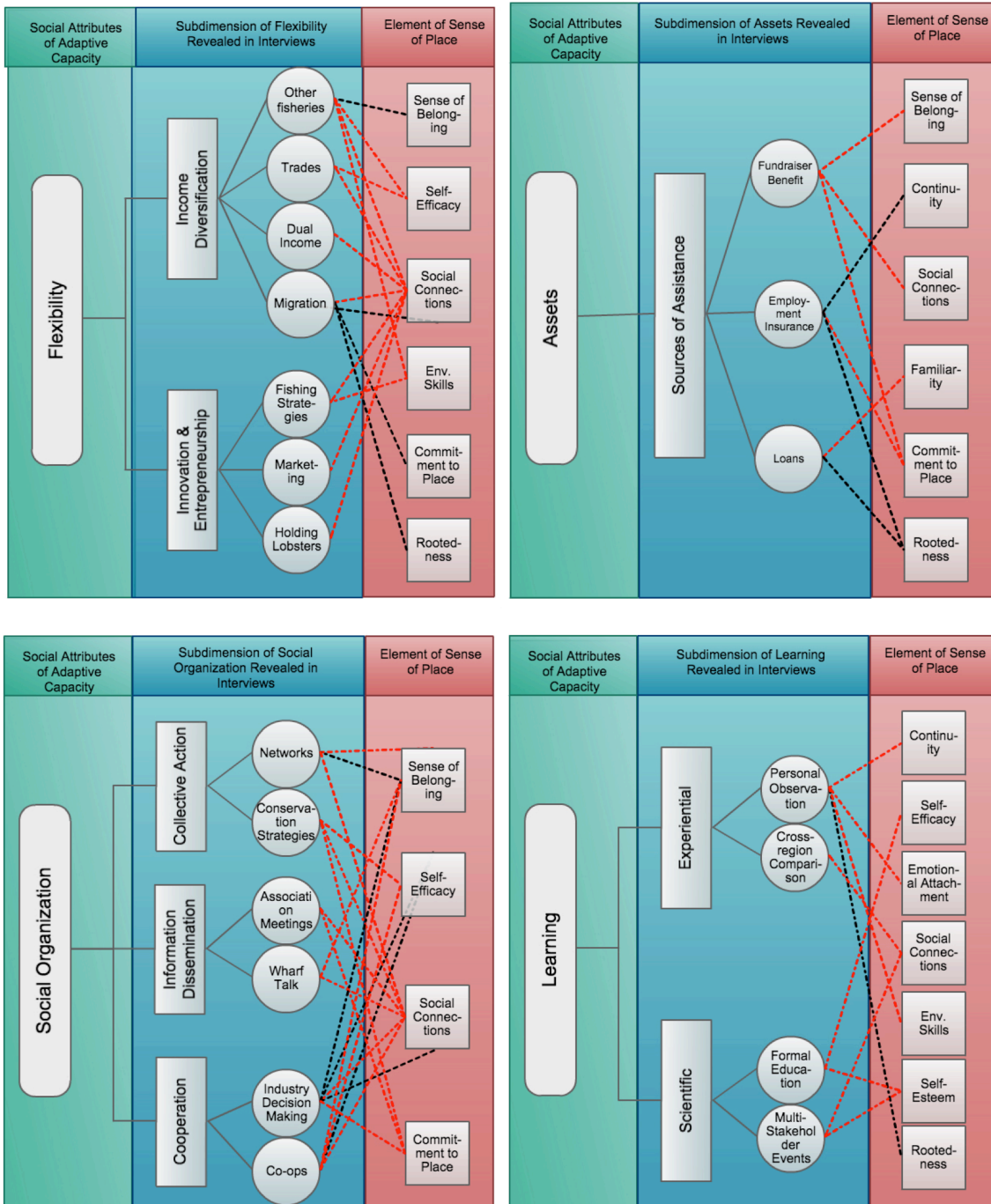
Figure 6.6: Interactions between the elements of sense of place and sub-dimensions of the social attributes of adaptive capacity as raised by participants. Red lines indicate positive relationships and black lines indicate inverse relationships.

6.3.1   Flexibility and Sense of Place

The elements of sense of place that were shown to connect with flexibility can be divided into two categories: income diversification, and innovation and entrepreneurship. In terms of income diversification social connections with people who work in other fisheries influence the ability to switch between industries if needed. For example, Fisher 16 mentioned starting a business catching and selling invasive green crab to fishers he knew to use as lobster bait (Pers. comm. July 8, 2013). This connection is supported by research that suggests strong social networks improve income opportunities through improved flow of information, social incentives and confidence in others (Granovetter 2005). Getting involved in other fisheries also requires diversity of environmental skills. The more knowledge and expertise a fisher has in multiple fisheries the easier it will be to find work in other fisheries. Self-efficacy, or the belief in one's fishing abilities, can affect whether fishers opt to pursue other fisheries. However, a strong sense of belonging to a particular fishery can deter fishers from pursuing other fisheries. For example, Fisher 3 spent the majority of his career as a longline fisher, a fishery that is generally considered more difficult and higher paying than inshore lobster fishing. However, with the decline of groundfish quotas Fisher 3 was faced with the prospect of switching fisheries, "I never been a lobster fisherman…Now this season I'm gonna be going lobstering, this is how much it's changed, I'm gonna go lobstering...Do I wanna? I just don't wanna go to Alberta so I'm gonna try" (Pers. comm., June 27, 2013).

Income diversification in coastal communities is not restricted to other fisheries, some fishers pursue various trades to supplement their fishing income. Social connections provide opportunities for people in need of services to connect with those who are skilled in certain trades. For example, Fisher 13 is a lobster fisher and Irish Mosser has taken up carpentry and welding projects in the offseason. Fisher 13 claims he doesn't need to advertise his work because of his connections with family, friends and neighbours who know who to call if they need a job done (pers. comm., July 11, 2013). As well, self-efficacy in one's ability to perform a trade and seek out customers is necessary in order to start a part time business. In Fisher 13's case carpentry and welding are not trades he is formally trained in, however, confidence in his own abilities has resulted in enough work to get him through the offseason for fishing.

Some households opt to have two income earners rather than just one to supplement fishing income. Social connections help connect non-fishing family members with available jobs

in the community. As most fishers are men, women were often the second income earner working in positions at the local bank, pharmacy, and ice cream shop.

While some fishers find ways to derive supplemental income within their communities during financially difficult times, many opt to find work out of province. These migrant workers tend to focus on the commercial fishing industry off the coast of British Columbia, the oil and gas industry in Alberta, or the mining sector in Ontario. As described in Section 5.2.1, outmigration was identified as one of the most concerning social changes within the study site and within rural Nova Scotia as a whole. While social connections with friends and family already working outside of the province can help fishers find full or part-time employment, connections with friends and family at home can deter individuals from leaving. Rootedness, or attachment to home, tends to dissuade people from looking for work far from home as mentioned by Fisher 25 in Section 6.2.9 who claimed she would 'be too homesick' to move out west. Additionally, commitment to place can dissuade people from looking for work far from home. As Section 4.3 explains, outmigration is a growing concern as the Province of Nova Scotia looks into how to attract and retain young people in the Province. Outmigration may be a beneficial adaptive strategy at the household level, and can benefit the community financially if the worker sends money home to family members who continue to reside and spend money locally. However, increasing rates of migration mean communities lose an important demographic of their population, namely young people and families who would otherwise support local businesses, become entrepreneurs and make up the essential volunteer base in the community.

Innovation and entrepreneurship offer another category of flexibility. Trying new and innovative fishing strategies can help fishers increase the quantity and quality of their catch, and hopefully improve their income. Fishers tend to share their secrets of the trade with only their closest friends and family members. However, social connections may allow fishers to share less private information about different bait types or trap designs. For example, when Fisher 23 goes for a Sunday drive with his wife Paula he is constantly "talk[ing] to people, see[ing] what they're doing different" (Pers. comm. June 7, 2013). Environmental skills learned from personal experience or passed down from previous generations also allow fishers to adapt the way they fish according to weather and water conditions.

Innovative marketing strategies can help fisher buyers find new and emerging markets to sell their product. Social connections can allow fish buyers and processors to learn about trends

in the industry and how to better supply customer demands, including expanding to overseas markets. However, individual business interests often prevail over the interest of the industry as a whole. The Report of the Maritime Lobster Panel recommends a coordinated and aggressive campaign, independent of buyers, to market Canadian lobster nationally and internationally (Thériault et al., 2013).

Some fishers decide to hold their lobsters in tubes in the harbour or in a holding facility to wait until the price increases. Social connections help fishers determine when they will sell held lobster in order to receive the best price. It should be noted, few fishers would share this information with anyone other than close friends and family members, but connections with buyers and transporters help inform this decision. For example, Fisher 23 used to work as a long haul truck driver and has maintained contacts in that industry who have provided him with valuable information on which day to sell his lobster in order to meet the deadlines for transporting lobsters to Europe for the lucrative Christmas rush.

6.3.2 Assets and Sense of Place

The connections between assets and sense of place can be best understood in terms of sources of financial assistance. As described in Section 6.1.2 fundraiser benefits can be an important source of financial assistance in times of need. Social connections allow community members to know who is in need in order to host a benefit for that person. A sense of belonging encourages a feeling of responsibility among community members to help each other and commitment to place establishes a motive to donate to benefit fundraisers.

Employment insurance fishing benefits (EI) are another source of financial assistance available to fishers during the offseason or times when no income is coming in. Seasonal employment such as fishing, farming and tourism often require EI in order to operate, but rootedness and an unwillingness to change can lead to a sense of entitlement to and reliance on EI benefits. Additionally, valuing continuity and placing importance on continuing generational fishing can lead to remaining in a fishery even after it is no longer economically viable. Despite some of these negative associations between sense of place and adaptive capacity, commitment to place can encourage people to accept EI benefits when income is unpredictable or scarce and continue living and contributing to the vitality of coastal communities during hard times. There is a fine balance between rootedness and commitment that many individuals interpret differently.

Loans are a third form of assistance influenced by attributes of sense of place. Section 6.1.2 describes how fishers can gain access to loans through a bank or the Fisheries Loan Board. Familiarity as a result of long-term residency in a place can improve credit ratings at local financial institutions making it easier to procure loans as was the case with Fisher 23 who was able to get a better interest rate and not have to put up his license as collateral when he borrowed money from his local financial institution rather than the Fisheries Loan Board. However, rootedness, or an unwillingness to change can also lead to a sense of entitlement to and reliance on loans. As one DFO-SCH business manager noted that many young fishers were accumulating large amounts of debt to purchase licenses and boats (DFO-SCH 2, Pers. comm., June 22, 2013).

6.3.3   Social Organization and Sense of Place

Three categories of social organization can be connected with attributes of sense of place: collective action, information dissemination and collaboration. A strong network of people is formed through intertwined social connections within a community. These networks provide a sense of belonging that, as described in Section 2.3.2 belonging to a group can contribute positively to adaptive capacity through sharing ideas and motivation or negatively by excluding people not considered to be part of the same group. Conservation strategies are another form of collective action that can be influenced by attributes of sense of place. Section 6.1.3.1 explained the initiative Irish mossers took to voluntarily stop harvesting for one week because they could see moss supply was low. Initiatives such as this require self-efficacy, the belief that action can affect change (in this case to species health) in order to motivate groups to take voluntary collective action to conserve resources. Social connections facilitate understanding of the causes and potential solutions to resource depletion. Further, commitment to place encourages a desire to maintain resource access for future generations, as was the case of the Chéticamp Management Plan explained in Section 6.1.3.1 that was designed to conserve lobster stocks for future fishers.

Information dissemination is another adaptive strategy linked to aspects of sense of place. Social connections at fishing association meetings allow fishers from different harbours to interact and share information. Meanwhile, commitment to place helps motivate fishers to volunteer for positions required to keep the associations operating. As Fisher 19 pointed out,

volunteer positions within the fisher are "glorious jobs that nobody really wants to take" (Pers. comm. June 15, 2013).

Although information is formally communicated at fishing association meetings, informally information is often shared between fishers through personal communication. Referred to by one participant as 'wharf talk', informal interaction, frequently at the wharf, make up a large part of the information fishers receive. Social connections among fishers (and sometimes a lack thereof) determine who people talk to and exchange information with at the wharf. Personal information on specific trap sites, bait type, and other tricks of the trade are rarely exchanged between fishers. Rather wharf talk revolves around environmental conditions, general challenges in the industry, the weather and community issues. As Fisher 23 explained in Section 6.2.11, "Some people go to the coffee shop and have their coffee and conversation, other people would go to the wharf" (Pers. comm. June 7, 2013). A sense of belonging to a harbour community is another motivator for fishers to gather at the wharf even in the offseason. This is exemplified in Geri Nickerson's account in Section 6.2.10 of the two older men at her harbour who regularly go down to the wharf to work on their small boats even though they no longer fish for a living.

Cooperation is another important aspect of social organization. Social connections among decision-makers can either positively or negatively influence industry decision-making at multiple levels. There is evidence that small harbours with close social ties, such as the West Berlin harbour function better than those where social connections are weaker. As with voluntary fishing association roles, commitment to place is one of the few motivations for fishers to volunteer to be on Harbour Authority Boards. A strong sense of belonging on the other hand can cause tension between different groups of fishers based on perceptions of insider/outsider distinctions. Additionally, self-efficacy, and the desire to 'be one's own boss' can inhibit effective cooperation within the fishing industry.

Co-ops have the potential to develop and flourish through cooperation among fishers. As described in Section 6.1.3.3, co-ops are not a popular form of management within the study site. However, one DFO-SCH business manager saw the potential co-ops could provide by offering cost savings through bulk purchasing and negotiating group insurance rates (DFO-SCH 2, Pers. comm. June 22, 2013). Self-efficacy can help reassure co-op members that they are capable of owning and operating a not-for-profit organization such as a co-op. However, the desire to 'be

one's own boss' can inhibit co-op formation as mentioned above. Social connections allow fishers from different areas to see how co-ops are organized and understand the benefits of this system over the status quo. Lastly, a sense of belonging to a co-op facilitates responsibility to the group rather than an individualistic attitude, which can in turn improve cooperation.

6.3.4   Learning and Sense of Place

Learning can be divided into two categories: experiential and scientific. Experiential learning includes personal observation and the ability to compare differences in conditions between different places. Environmental skills and knowledge of place conditions allow for personal observation of specific changes. Examples of personal observation of change made possible through environmental skills include shifts in species migration and changes in the stomach contents of sculpins, a fish often used to bait lobster traps. - Emotional attachment to place means change can be observed on an emotional level as well as a rational level. Feelings of profound loss when places or lifestyles that used to occur in a place are forced to change. The most common emotional response to change was in conversations about the high rates of outmigration from rural communities. Lastly, rootedness in place can result in observations of change over a long period of time. As mentioned earlier, over 90% of people in the study site are third generation or more Canadian and many have three or more generations of history in the local area. This amount of time in a place allows observation of change, particularly the impacts of climate change described in Section 5.1. Fisher 23 explains one of the major changes he's noticed over his lifetime, "When I walk down to the old homestead there where I grew up, there's things there that stick in my mind that you remember doing when you was a kid right…And erosion is one thing that you notice a lot right" (Pers. comm. June 7, 2013).

The ability to compare changing conditions between regions is influenced by social connections. As quoted in Section 6.1.3.2 Fisher 23 mentions being in contact with other fishers through phone calls and word of mouth saying that even when he is fishing three hours off shore he "pretty much know what's going on in Yarmouth" (Pers. comm. June 7, 2013).

Learning can also take place in terms of scientific knowledge obtained either through formal education or multistakeholder events. Self-esteem and self-efficacy in a school setting, often encouraged or dissuaded by teachers can influence whether an individual continues their

studies. Twelve out of twenty-seven fishers interviewed did not complete high school, indicating that rates of formal learning are quite low in the fishing industry.

Often scientific knowledge among fishers came a result of personal experience or interactions with scientists and decision makers at multistakeholder events rather than through formal education. Section 6.1.4.2 indicates some fishers are self-taught when it comes to a scientific way of understanding the fishery and climate change impacts. Social connections with influential politicians and academics can help get industry members get involved in multi-stakeholder events such as conferences and scientific fish surveys. Furthermore, self-esteem is necessary for fishers, who often do not have high levels of formal education, to attend and participate in multi-stakeholder events with scientists and politicians. These events can be frustrating for all parties involved as fishers, scientists and politicians often do not speak the same technical languages or have the same worldviews. However, patience and perseverance have resulted in more involvement from fishers in decision-making processes.

This section outlined the positive and negative connections drawn between sense of place and the social attributes of adaptive capacity presented in Figure 6.6. Although I have focused specifically on sense of place influences on the social attributes of adaptive capacity, it is possible that the connecting lines in Figure 6.6 are not unidirectional. Adaptive capacity and adaptation decisions can reasonably be expected to influence people's experiences and bonds with place. For example, the impacts of outmigration of individual's sense of belonging and rootedness would be interesting content for a future study.

My explanations for these connections come from interview conversations with participants and a thorough review of relevant literature presented in Chapter 2. This viewpoint represents one interpretation of the data. Section 3.7 describes the opportunities and challenges involved in conducting this research project and my own positionality that inevitably influences my interpretation of these results. Rival explanations of these results may exist in different communities and among different participants, however this analysis attempts to represent the perspectives of the 36 participants interviewed in the South Shore study site during the summer of 2013.

6.3.5 Maladaptive Sense of Place

While many elements of sense of place enhance adaptive capacity by improving

flexibility, assets, social organization and learning, other elements may encourage maladaptive strategies. According to Grothmann & Patt (2005) maladaptation includes avoidant reactions to change (such as denial of threat) and adaptation that increase rather than decrease damage from climate change or other threats. As indicated in Figure 6.6 rootedness, continuity, sense of belonging and commitment to place had associated maladaptive traits. In these cases, elements of sense of place may be barriers to the ability of individuals and communities to adapt to change. Barriers tended to arise in situations where participants were resistant to change or unwilling to be associated with a particular group of people. Environmental psychology literature explains this type of behaviour by highlighting how personal identity is dependent on continuity of place and existence of geographically distinct groups within which people see themselves as insiders (Twigger-Ross & Uzzell, 1996). Disruption to this continuity or sense of belonging can cause people to feel threatened and to resist change. These reactionary sentiments often arose in the interviews in response to conversations about government policy or regulation, particularly in regards to restrictions placed on the groundfishery. On this topic, Fisher 15 remarked, "I think they should have left it back the way it was a hundred years ago" (Pers. comm. July, 12, 2013). Rather than suggesting innovative ways DFO could better engage with fishers, this participant would rather have no change at all. These feelings often stem from continuity and rootedness, wanting the future to resemble the past. A young fisher, who expressed a willingness to try adjusting trap limits and different season openings for the lobster industry in order to curb low prices and protect stocks indicated that his attitude toward change was rare, "There's always things that personally I'd be willing to try. But there's so many that get so upset and don't want to try that stuff. They see it as a loss and not a gain" (Fisher 18, pers. comm. July 9, 2013). In addition to holding on to continuity and rootedness some fishers expressed recognition of distinct insiders and outsiders in coastal communities. Conflict often arose as a result of an unwavering sense of belonging to a particular group along with uncompromising commitment to a particular community. A DFO-SCH business manager explained:

[There are] big rivalries along the South Shore and some of it is fishing related rivalries, some of it is personal rivalries, so and so slept with so and so's wife back in 1995 or a family feud type issues. Small town type stuff, a lot of it's competition.

(DFO-SCH 3, pers. comm., July 2, 2013)

When belonging and identity are rooted in very localized places it makes it difficult for cooperation and collective action to occur at the industry level. For example, lobster fishers legally belong to the lobster fishing area (LFA) within which their license is registered as described in Section 4.4.2. Each LFA is regulated by different restrictions including trap limit, carapace length, season start dates and length of seasons (ranging from two to six months). Within the industry, most fishers see LFA 34, west of the study site as being the most privileged and profitable LFA. As a result some fishers from other LFAs hold a certain level of resentment against fishers from these more prosperous areas and implying a hesitancy to cooperate on industry issues because they worry their own interests will not be equally represented (Pers. comm., Fishermen's Forum workshop, Port Hawkesbury, November 8, 2014). Presumably fishers from prosperous areas are also unlikely to collaborate with members of other LFAs in fear that better representation of other area's interests would result in less of their own success. Better understanding this dynamic and finding creative ways to break down these barriers is important for the success of future industry wide adaptation planning.

6.4 Chapter Summary

This chapter outlines participants' experiences of adaptive capacity and sense of place and connects these two concepts by examinig how sense of place influences adaptive capacity. Experiences of adaptive capacity were understood in terms of income flexibility, assets, social organization and learning. The results of this chapter indicate elements of sense of place were influential in determining the ability of individuals and communities to adapt to the impacts of social, economic and ecological change. Often this influence resulted in adaptive behaviour and decisions, while at other times the influence was maladaptive. Maladaptation most frequently occurred out of a reactionary sense of place, where change was viewed as consistently negative and boundaries between groups of people were definitive. Specific groups of insiders and outsiders in the Nova Scotia fishery make cooperation and collective action a challenge. Industry level coordination becomes increasingly important as social and ecological systems continue to change at a rapid pace, and fishers deal with issues around lobster prices, outmigration, and the increasingly severe impacts of climate change described in Chapter 5. In response to these changes, fisheries governance organizations and municipalities are establishing various adaptation strategies. The next and final chapter of this thesis discusses the research results

presented in Chapters 5 and 6 and synthesizes these results for community leaders and decision makers in local, provincial and federal agencies as laid out in research objective three.

Chapter 7:   Conclusion

"I watch these men walk off of the wharf, old men, young

men, lobstering, do you know that they worked as hard for no

money as they did for the good trip. And they walk off the

wharf...and they have done it some of them since they were 12

years old. And their fathers did it and their grandfathers did it

and their boats were built in this harbour and they have been

fishing from this harbour forever. Asking very little from

anybody else other than the right to go fishing."

~Geri Nickerson, Woods Harbour

Adaptive capacity to change is often measured only in terms of physical ability such as access to resources, modern technology, infrastructure, and effective institutions (Smit & Plifosova 2003; Armitage 2007; McClanahan and Cinner 2012). However, the ability of a community or individual to adapt to change includes socio-economic elements such as perceptions of change, how people make decisions and cultural values in addition to physical attributes (Grothmann & Patt 2005; Adger et al. 2009; Wolf & O'Brien 2010; Adger et al. 2011; Wolf et al. 2012). Sense of place provides one lens through which to view the socio-economic attributes of adaptive capacity (Fresque-Baxter & Armitage 2012; Adger et al. 2013; Amundsen 2013). In this context, my research project aimed to address the question of how individual and collective sense of place impacts coastal communities' ability to adapt to change. Much of the adaptive capacity literature focuses on adaptation specifically related to climate change (Adger et al. 2011; Charles 2012; Fresque-Baxter & Armitage 2012; Willox et al. 2012; Adger et al. 2013). However, socio-economic change occurs simultaneously with climate change and is often not distinguished as a separate problem by people responding to change (Leichenko & O'Brien 2008; Moerlein & Carothers 2012). My research project focuses on the fishing industry in coastal communities in Queens and Shelburne Counties, Nova Scotia. It considers how elements of sense of place expressed by fishers, fish buyers, harbour supervisors and youth enable or hinder coastal communities to deal with change.

The research was organized around three objectives:

a) to document multigenerational perceptions of social, economic and ecological change in selected Nova Scotia coastal communities;

b) to identify and analyze experiences of adaptive capacity and sense of place and reveal links between these two concepts that influence the ability of individuals and communities to adapt to change;

c) to synthesize results for community leaders and decision makers in local, provincial and federal agencies.

This chapter summarizes research results presented in Chapter 5 and 6, explaining how these chapters fulfill my first and second objectives. I go on to draw conclusions based on the results obtained. Lastly, I provide three recommendations for community leaders and policy makers in fulfillment of my third research objective.

7.1   Multigenerational Perceptions of Change

Participants recognized evidence of both biophysical and socio-economic change within the study site. Biophysical change included evidence of increased storm intensity and higher rates of erosion. Increasing sea level rise was particularly noticeable due to wharf flooding during storm surge events, submerged lobster trap buoys and higher high tide levels. Shifts in seasons and migration patterns were noticed in the increasing abundance of lobster landings. Evidence from experimental traps also indicated lobsters were moving further offshore. Ocean temperatures were also thought to be increasing based on the frequency of soft-shelled lobster and loss of sea ice.

Although participants addressed the physical environmental changes they experienced, the majority of participants' concerns centred around socio-economic change in their communities. The greatest worry was declining population due to outmigration from rural communities to urban centres and to the oil and gas industry in Alberta. Rising costs for entering the fishery and day-to-day expenses along with safety concerns and increasing corporate monopoly over fishing and lobster licenses raised issues with resource access. Declining wharf

prices for lobster, decreased days on the water as a result of storms and an inability to know lobster prices before leaving the wharf contributed to economic concerns. Shifting governance institutions and processes around lobster fishing territory and Harbour Authority management presented both challenges and opportunities. The impact of fewer people with increasing management responsibilities has lead to volunteer burnout in many coastal communities.

The 'multigenerational' aspect of this objective came through the results of a photovoice project with youth participants. Participants ranged from 14-19 years old and provided photos that depicted three places they liked in their communities and three places where they would like to see change. Rather than attempting to understand what has changed, as was the goal with the semi-structured interviews, the photos youth took reflect where they would like to see change. This approach was appropriate considering that youth have had shorter lifespans over which to observe change than adult participants. Youth perceptions of change lead to conversations about youth outmigration from rural communities and where participants saw themselves living in the future. Despite their desire to leave, all participants wanted to have the option of coming back and living in their communities if and when desired. Youth participants added a valuable perspective to understanding change in coastal communities.

7.2 Experiences of Socio-Economic Adaptive Capacity and Sense of Place

Four attributes represented experiences of socio-economic adaptive capacity: income flexibility, assets, social organization and learning. Examples of flexibility included diversifying sources of income and employing innovative and entrepreneurial strategies in fishing. The importance of assets was displayed in examples of alternative sources of financial support including the community, government programs and private or public loans. Social organization was exemplified in the form of collective action, information dissemination and cooperation. Lastly, learning was evident through experiential means such as personal observation as well as scientific information obtained through involvement interactions with scientists and academics.

Experiences of sense of place were identified according to fourteen categories 1) emotional attachment; 2) environmental skills; 3) self-esteem; 4) self-efficacy; 5) continuity; 6) uniqueness; 7) security; 8) sense of belonging; 9) rootedness; 10) familiarity; 11) social connections; 12) commitment to place; 13) aesthetic value; and 14) labour contribution. Each category highlighted specific elements of person-place bonds described in the interviews.

Examples include childhood memories of place indicating attachment, knowledge of fishing grounds, pride in owning a boat and knowing and being known in a community. Although not all elements of sense of place directly relate to adaptive capacity, certain elements of sense of place influenced the ability of individuals and communities to adapt to the impacts of social, economic and ecological change. In most cases elements of sense of place helped build adaptive capacity by encouraging commitment and reliance on others. However, in some cases sense of place proved maladaptive by encouraging an unwillingness to change, such as between self-efficacy displayed in the desire to be one's own boss and cooperation among fishers. A diagram of the linkages between sense of place and adaptive capacity are shown in Figure 6.6.

7.3   Summary of Key Findings

The research concludes first that sense of place influences adaptive capacity through multiple avenues among research participants. Second, social connections were the most important element of sense of place for both adult and youth participants. Lastly, rural coastal communities display strong socio-economic attributes of adaptive capacity despite often lacking in physical resources and institutions.

First, this research provides a detailed case study analysis to reinforce the findings of other studies that suggest socio-economic attributes influence individual and communal adaptive capacity (Adger et al. 2009; O'Brien & Wolf 2010; Adger et al. 2013). Recent literature refers specifically to the role of person-place bonds (sense of place, place attachment, place identity) in reinforcing socio-economic adaptive capacity (e.g., Adger 2011; Fresque-Baxter and Armitage 2012; Amundsen 2013). My conceptual framework, described in Section 2.5, applies fourteen attributes of sense of place to four socio-economic attributes of adaptive capacity in an attempt to extract subtle connections between these two concepts. The results of data analysis highlight examples of how sense of place influenced participants' flexibility, assets, social organization and learning. Not all fourteen elements of sense of place were identified as connecting with adaptive capacity, however the majority did connect with at least one of the four socio-economic attributes of adaptive capacity. This does not mean these results are consistent for all individuals or all communities. Sense of place was used as a lens through which to better understand adaptive capacity. These results suggest sense of place can be an effective way to understand the often-excluded socio-economic attributes of adaptive capacity. Arguably many other lenses

could provide equally useful insight into this relationship, however I have chosen to focus this research specifically on the interactions between sense of place and adaptive capacity. The connections found in analyzing this data reinforce the importance of including socio-economic dimensions of adaptive capacity in addition to material attributes when designing adaptation strategies. Admittedly, socio-economic attributes of adaptive capacity can be more difficult to measure than material attributes. For example, increased access to funding is easier to measure (in dollar amounts) than stronger social connections. However, the more research and evidence that exists to support this claim, the more likely socio-economic attributes are to be included in future adaptation plans. My research project provides one methodology for better accounting for socio-economic factors when analyzing adaptive capacity.

Second, the results show that social connections were the most frequently mentioned element of sense of place connecting with adaptive capacity. Figure 6.6 shows that social connections account for 17/50 or 34% of the connections drawn between elements of sense of place and socio-economic attributes of adaptive capacity. Interview participants frequently referred to social connections when giving examples of all four socio-economic attributes of adaptive capacity. These connections were most obvious in examples of flexibility and social organization, which respectively had seven and six lines connecting with 'social connections' in Figure 6.6. However, many participants also acknowledged a lack of social cohesion as the cause of poor cooperation within some harbours. Photovoice participants spoke about either the importance of social connections or a lack thereof in 15/24 photos they took. Social connections can include formal and informal interactions with family, friends, neighbours and local politicians. These findings are important because, as Pelling et al. (2005 p. 311) point out:

> *It may well be that this mess of interactions forms the social raw material that shapes capacity to identify new information, learn and cope with change, and is as important for long-term adaptive capacity as the more easily observable formal organisational structures that are predominantly used to indicate adaptive capacity.*

Social connections play an important role in individuals' daily lives and can have a positive influence on the socio-economic attributes of adaptive capacity (Pelling et al. 2005; Wilson-Forsbert 2013). It follows that individuals or communities looking to improve their adaptive capacity could start by pursuing activities that encourage social networking and social capital building. In an ideal world I imagine this looking like events that connect people and form trust

bonds such as festivals, farmer's markets and parks not being the first to receive funding cuts. Support for local businesses and organizations that provide gathering places such as coffee shops and pubs, that donate to local sports teams and that offer a regional sense of identity would receive more support than multinational companies that are not financially tied to local communities. Ideally these events and activities would be recognized not just as fun or recreational luxuries but rather as fundamental elements to building adaptive, resilient rural communities.

Lastly, my results point to the important, yet often undervalued characteristics rural coastal communities embody. In the summer of 2014 I met a man from Toronto who, after listening to my explanation of the basic concepts of my research project, suggested residents of struggling rural communities should 'just move to the cities'. I imagine this man is not alone in his views on urban migration as a panacea for rural economic development. However, Canada's rural communities are largely the ones that grow, catch, cut and extract the primary resources Canada depends on. Many rural communities, especially in Atlantic Canada are facing challenges associated with job availability as the Canadian economy shifts from the primary resource sector to the knowledge-based economy, making it increasingly difficult for young people to remain in rural areas (Wilson-Forsbert 2013). When looking at highly adaptive societies, rural communities struggling with high unemployment rates and low youth retention can be easily overlooked if one considers only material attributes of adaptive capacity. However, valuing flexibility equally to job security, asset assistance to net wealth, social organization to independence and learning to education level, would highlight many of the adaptive characteristics of rural communities. That being said, socio-economic adaptive capacity cannot replace the need for material resources and capacity building. Rather these two factors fulfill different elements of adaptive capacity that should be equally valued. My research project suggests rural coastal communities have a unique ability to adapt based on evidence of connections between sense of place and adaptive capacity. In times of rapidly changing climatic and socio-economic conditions, it seems misguided to neglect the strengths of rural communities including the ability to work together to solve problems and adapt to change.

7.4   Recommendations for Community Leaders and Government Agencies

This section highlights three recommendations for community leaders and government agencies looking to incorporate socio-economic attributes of adaptive capacity in adaptation planning. First, interviews for this research project revealed that small harbours and wharves reinforce sense of place and social connections within rural coastal communities. These socio-economic benefits should be better considered in the DFO-SCH funding criteria as the department continues to advance its zonal planning goals (explained in Section 4.4.2). Second, outmigration continues to pose a severe threat to rural coastal areas in Nova Scotia. For many the opportunities available in cities and out of province outweigh the sense of place that draws them home. The very elements that contribute to sense of place, such as social connections, self-efficacy and self-esteem erode as population decreases and businesses and services cease to exist. Thus, in accordance with the Now or Never Nova Scotia report (Nova Scotia Coalition on Building Our New Economy 2014) I recommend provincial and municipal governments make population retention a priority. Third, the Small Craft Harbours branch of DFO is in the unique position of being a federal department with a generally good repertoire with fishers. The social connections that have been built between fishers and SCH business managers can serve as a model for other fisheries management branches. This would involve looking at building trust, leadership and co-management within these institutions.

Nearly all participants commented on the importance of harbours and wharves not only for their income but also for community well-being and sense of place. Results show harbours and wharves as the source of social connections, self-efficacy, aesthetic value, emotional attachment, belonging and continuity. These elements of sense of place in turn enhance income flexibility, social organization, assets, and learning in coastal communities. Many harbours are old and deteriorating. Section 4.4.2 describes how DFO-SCH is often forced to divest its least used harbours in order to bring others, considered to be 'core harbours', up to safe and efficient working standards (Coastal Communities Network, 2004).

Decisions about how funding gets allocated to different harbours and which are divested are based on a list of criteria described by DFO-SCH participant Graham Smith in Section 5.2.4.2. The list of seventeen criteria include the number of vessels, value of the product, amount of fish landed and wharf conditions. While the point values attributed to each criterion are confidential and therefore unavailable, Smith indicated more weight was given to criteria such as

signage and signed license agreements, as they were criteria all harbours could reasonably achieve regardless of the number of vessels or value of landings. Despite this consideration for fairness, nearly all items on this list, with the exception of 'willingness to contribute labour or money' can be considered material attributes of functioning wharves. I recommend DFO-SCH revaluate this list to include subjective attributes of Harbour Authorities, such as strong social networks, cooperation, and trust in order to account for factors that this research project has shown encourage the development of adaptive capacity. Understandably, some harbours, such as those supporting just two or three boats, cannot justifiably be maintained with federal tax dollars. However, DFO-SCH business managers should be able to account for socio-economic attributes of functioning, adaptive harbours when evaluating how to allocate funding.

Secondly, participants identified outmigration of both youth and established residents as one of the most concerning and urgent challenges facing rural Nova Scotia communities. Outmigration both impacts and is impacted by individual sense of place. Social connections, rootedness and commitment to place influence individual migration decisions as a form of adaptation. At the same time, continually declining rural populations deteriorate sense of place for many residents who remain in rural communities, thus decreasing adaptive capacity throughout the Atlantic region. While the ability to migrate improves the adaptive capacity of individual households, it deteriorates community level adaptive capacity. As populations decline, services that are a source self-esteem and self-efficacy including gas stations, grocery stores and fisheries offices for example, decline as well. Additionally, revenue from municipal taxes decreases, limiting services such as snow removal, road repair and recreational programming. As youth participants pointed out, this negatively impacts the aesthetic/experiential value of their communities. The Now or Never Nova Scotia (Nova Scotia Coalition on Building Our New Economy 2014) report states outmigration from rural areas is mainly due to an increasing reliance on the service sector economy rather than goods production, with a concentration of these services in Halifax (Nova Scotia Commission on Building our Economy, 2014). The report suggest a focus on the microeconomy in Nova Scotia as a whole and a specific focus on "effective marketing, better organization and improved quality" (p. 164) in the fishery. The report recognizes improvements in these areas are unlikely to reverse rural outmigration, but may be able to slow the rate at which it occurs. My second recommendation is that the Provincial Government prioritizes slowing the outmigration trend by providing incentives for people to stay

and work in Nova Scotia and by attracting new residents from other provinces and countries. My research project suggests that even slowing outmigration could reinforce self-efficacy, commitment to place, social connections and rootedness, and thus support the adaptive capacity of rural communities.

Third, the Harbour Authority system works surprisingly well considering the historic lack of trust between fishers and DFO after the collapse of the groundfishery. Although many participants still felt the fisheries management branch of DFO unnecessarily restricted resource access, attitudes toward the Small Craft Harbours branch were mostly positive. Fishers and DFO-SCH business managers alike indicated mutual respect for one another and, for the most part, trust and open communication as outlined in quotations from participants in Chapters 5 and 6. Admittedly, the Harbour Authority system has flaws such as volunteer burnout and difficulty with peer enforcement. However, the devolution of core harbours to fishers allows more decision-making power at the local level and in many cases easier access to funding for wharf improvement projects. I recommend DFO continue to support the Small Craft Harbours branch and consider applying the model to other branches such as fisheries management in order to build trust and social connections between fishers and government personnel in order to build adaptive capacity in the fishing industry.

7.5   Community Contribution

My research project aimed to make relevant contributions to the communities in which I worked. During my time in the study site I offered an introductory photography workshop for youth to teach the basics of photography for personal enjoyment and skill building for resumes. Five youth between 15-19 years old participated in the workshop, although only four of those ended up participating in the photovoice project. After leaving the research site I co-contributed an initial summary of results to the Sustainability Coordinator for Shelburne County to be incorporated into their MCCAP. I also co-curated a photography exhibit with staff at the Shelburne County Museum for the annual Shelburne County Lobster Festival. The photos were donated to the museum for use in future exhibits.

7.6   Future Research

This research project provides opportunities for additional studies on similar topics. Expanding the issues raised in this research to coastal communities throughout the province would broaden its relevance. Lobster fishers around Nova Scotia likely face slightly different challenges depending on their location (Northumberland Strait, Gulf of St. Lawrence, Bay of Fundy or Atlantic Ocean). The length and timing of the lobster season (varying between two to six months) may affect the socio-economic challenges associated with industry viability and willingness to cooperate.

My research alludes to but does not explicitly distinguish the difference between individual and community adaptive capacity. An opportunity exists to further investigate this trade-off within Canada's migrant workforce, particularly those migrating from rural Atlantic communities to the Alberta oil and gas industry. The participants in this study were primarily those who chose to remain in their communities and work in the fishery. An additional study among a broader range of participants is necessary to comment further on this issue. What factors influenced their decision to seek work out of their home communities? What would have to exist in order for them to return? Do they want to return? Such a study would be useful for academics and decision-makers alike considering the overwhelming rates of outmigration from rural Atlantic communities in recent years.

7.7   Research Reflections

One of the joys of conducting a qualitative research project on a topic such as sense of place is the invitation to be part of someone's very personal life for a brief moment. Having spent the summer of 2012 living in a coastal community in rural Nova Scotia, I was thrilled to have the opportunity to return to this part of Canada to learn more about the communities, industries and challenges people are facing. As with my first visit to Nova Scotia I was continually astounded at the openness and hospitality of the people I met during my second visit. Interviews that were supposed to last no more than an hour went on for three, four, even five hours. I hope the opportunity I was able to provide to my participants for their voices to be heard and stories told offers a small benefit in exchange for their time and honesty.

One of the challenges of conducting a qualitative research project on a topic such as sense of place is the difficult task of weaving together multiple perspectives and experiences in a

way that makes sense and accurately represents not only what people said but what they meant. There are many ideas, stories and interesting tangents that did not make it into the final version of this thesis for the sake of space and relevance. What has made the final cut is my interpretation of the daily experiences and emotional bonds participants have with the places they live. I feel incredibly fortunate to have witnessed the telling of evocative stories of fear, love and the lifestyles that have been the foundation of maritime culture past and present. I can only hope I have done a sliver of justice to these stories and the emotion they evoke in their tellers through writing this thesis.

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Appendix A- Working definitions of sense of place

Attribute of SOP	Operational Definition (Adapted from Fresque-Baxter & Armitage 2012)
Emotional attachment	- Emotional bonding between a person and a place, including both the physical location and the social milieu. Attachment to specific places or features of place
Environmental Skills	- Knowing how to use a specific environment to meet an individual's physical, mental and spiritual needs.
Self-esteem	- An individual's opinion of his or her own self-worth
Self-efficacy	- A feeling of having the ability to accomplish the goals one sets out to complete.
Continuity	- Preservation of both identity and the physical characteristics associated with a place
Distinctiveness/ Uniqueness	- Distinguishing one's place from other places based on its unique qualities and creating a distinct identity based on these differences
Security	- Physical, emotional and psychological safety - Feeling able to 'be one's self'
Sense of Belonging	- Feeling that one belongs in a place - A sense of 'insideness' within a social setting
Rootedness	- Feeling at home in a place - Being away results in homesickness - Can result in an unwillingness to change
Familiarity	- 'Knowing and being known in a place' (Fresque-Baxter & Armitage 2012 p.255)
Social Connections	- Places where social gatherings take place - A sense of community
Commitment to Place	- Seeing oneself remaining in a place in the future - 'Wanting to stay in a particular place' (Fresque-Baxter & Armitage 2012 p.255)
Aesthetic/ experiential Value	- Considering a physical and/or social environment aesthetically pleasing, enjoyable or beautiful
Labour Contribution	- Contributing time or physical labour to build or modify a place

Appendix B- Interview protocol

	Purpose	Questions
Part 1-General Information	Information on personal history to allow analytical thematic grouping of responses	• Age range: • Gender: • Years lived in the region: • Occupation(s): • Proximity between house and wharf: • Tell me about your heritage/ancestry and how you came to live here. • How many generations has your family been in the fishing industry?: • How did you decide to get into fishing?
	Fishing information to provide an overview of the community	• Where do you fish (ie. in shore, off shore) and what do you fish? • Do you own your boat? Own the license? • Who did you buy your license from? • Do you have any other sources of income? Do the others in your household (including children?)
Part 2: Open Ended Interviewing on Exposure Sensitivities/Adaptive Strategies	Gather information about environmental change to contextualize adaptive capacity	• Have you noticed any changes in your physical environment over the course of your life? • What changes have you noticed in your community? • How has your occupation changed over the course of your lifetime? • What is your hope for your boat in the future?
	Identify flexibility and willingness to adapt to change	• Have you made any changes to your boat since you bought it? • Is it common for fishers to share information about where the best catches are or is it kept secret? • How would you feel if you had to move from your town in order to find employment?

	Purpose	Questions
Part 2 con't: Open Ended Interviewing on Exposure Sensitivities/Adaptive Strategies	Understanding insideness and outsideness to gain an understanding of place boundaries	• What does it mean to be a 'come from away' (CFA) in your community? • What defines someone who is not 'from away'? • What distinguishes your town from other towns in this region? • What does it mean to be from the East Coast/Atlantic Canada?
	Place attachment/identity questions to gain an understanding of a participant's sense of	• Do you like living here? • Have you ever lived outside this town? Outside Nova Scotia? • Have you ever traveled outside this town/NS? • If so, what (if anything) did you remember or miss about this town while you were away?
	Conscious *vs.* unconscious place creation questions in order to gain an understanding of a participant's sense of place	• Describe a place where you feel (or in the past have felt) the most comfortable. • How would you feel if you no longer had access to that place? • Describe to me your average day/daily routine (on season and off season?): • How did this harbour get its name? • What does the name of your boat mean? • How were different places around here named?

	Purpose	Questions
	Gather information about the history and activities at the harbour front to understand the material and socio-economic value of wharves	• Have you always fished from this harbour? • How would you feel if this wharf were no longer accessible to your community? • Are there any old harbours near by that were shut down? If so, why did they close? Did it affect you in any ways? • What is the history of the wharf you dock at? Who built it? Where did the money come from? Who manages it? Has this always been the case? What existed before the wharf? • In your opinion is the Harbour Authority system the best way to manage the harbour? Are there any problems with funding? • Who do you think will make up the Harbour Authority (harbour master, etc.) when the current board retires? • Who do you normally talk to when you are at the wharf? • What does the wharf represent/mean to you? • Besides fishing, what other activities take place at the wharf? • Is the wharf financially self-sufficient? • If fishing were no longer a viable occupation here (be careful with this question!) in your opinion would it be worthwhile to keep the wharf or not?
Part 3: Guided Interviewing	Refer to answers given in part one and two and ask participant to elaborate on anything that requires more details	For example… • How do you feel about the people who have left? • What value does the wharf provide to the community? Festivals, recreational activities, fishing tournaments etc. • Have you noticed evidence of coastal erosion, more frequent/intense storms, sea level rise, temperature changes, seasonal shifts, availability of lobster/fish, changes in quality of catches. • What changes could be made (and by whom) to address some of the concerns you raised? • If you were conducting this research is there anything else that you would ask about that we haven't covered today?

Appendix C- Photovoice poster

FREE photography workshop for youth!

Are you:
* 14-20 years old
* Born and grew up in Shelburne area
* Interested in learning about photography
* And do you like free pizza?...Trick question! Who doesn't like free pizza??
Must be available:
-**July 17th 6-8pm**: free photography workshop followed by a photo challenge that must be

> I am looking for people who fit this description to participate in a fun university research project designed to explore sense of place in Atlantic Canada. You will be asked to take photos of your community and discuss why particular places are important to you and where you would like to see change in your community.

completed within 1 week
-A one-hour interview at your convenience during the week of **July 22nd-26th**
-**July 29th 6-8pm**: group discussion and FREE PIZZA!
* No previous photography skills required
* Participants may use their own digital camera/cell phone or one of the disposable cameras provided
Contact Shandel Brown at 875-4071 or 226-791-2207 for more info or to sign up

University of
Waterloo

This research project has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

Appendix D- Photovoice project description

Please take 6 photos total:

a) 3 photos of places that are important to you in your community
- these could be places that are fun, that have history, that are symbolic, that are important to your family, that you find particularly beautiful, places where you feel comfortable, where you can be yourself, they can be large or small places.

b) 3 photos of places where you would like to see change in your community
- these could be places where there has been changes you didn't like, places that you think could be improved, places that used to be important but are gone, or that never existed but you wish were there.

Photos can be literal or represent something that you will explain to me later. Your explanation is more important that how the photo turns out. You can use this as a chance to experiment with your camera but QUALITY DOESN'T MATTER, the important thing is what you intended to take a photo of.

You can use photos that you've already taken if you prefer.

Please email your photos on or before **Tuesday July 16** to
shandel.brown@gmail.com

Appendix F- Coding Structure

Biophysical Change	
Ocean temperatures	Less freezing
	Water temperature changes
	Product quality
	Species abundance
Sea level rise and flooding	Sea levels
	Flooding
Season and migration shifts	Seasonal changes
	Migration changes
	Receding lobster grounds
Storm frequency and intensity	Erosion
	Wind
	Storm characteristics
	Stronger currents

Sense of Place
Aesthetic value
Commitment to place
Continuity
Emotional attachment
Environmental skills
Familiarity
Rootedness
Security
Self efficacy
Self esteem
Sense of belonging
Social connections
Uniqueness
Other

Socio-economic Change	
Resource access	High expenses
	Corporate monopoly
	Oil companies
	Trust agreements
	Increased safety risk
Demographics	Aging fleet
	Outmigration
Economic challenges	EI reliance
	Income predictability
	Lobster price
Governance	Unofficial territory
	Volunteer fatigue
	Enforcement

Adaptive Capacity		
Physical	Emergency preparedness	*Contingency plan*
		Move boats
	Fishing strategies	*Adjust fishing grounds*
	Gear adjustments	*Type of traps*
		Larger boats
	Infrastructure	*Anthropogenic structures*
		Dredging
		Increase height
Socio-economic	Assets	*Community assistance*
	Flexibility	*Income diversification*
		Innovation and entrepreneurship
	Learning	*Experiential*
		Scientific
	Social organization	*Collective action*
		Information dissemination
		Cooperation
Mal-adaptive	Unwillingness to change	

Appendix G- Verbal Consent Script

Verbal consent was acquired for the six quotations used at the beginning of Chapters 2-7 that are attributed to their speaker.

"I would like to use a particular quotation from your interview at the beginning of a chapter of my thesis because I think it shows insight into (*fill in the blank).* The University requires that I read you the quotation and get your consent to put your name under it so that I don't misrepresent you in any way. (*Read quotation).*

Will you allow me to use this quotations and identify yourself as the speaker?"