

**EXPLORING BARRIERS TO SUCCESS FOR COMMUNITY-BASED
ORGANIZATIONS ENGAGED IN THE ADAPTIVE CO-MANAGEMENT OF
PARKLAND**

by

Micheal Jerowsky

B.A., The University of British Columbia, 2016

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES
(Geography)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

August 2019

© Micheal Jerowsky, 2019

The following individuals certify that they have read, and recommend to the Faculty of Graduate and Postdoctoral Studies for acceptance, a thesis/dissertation entitled:

Exploring Barriers to Success for Community-Based Organizations Engaged in the Adaptive Co-Management of Parkland

submitted by Micheal Jerowsky in partial fulfillment of the requirements for

the degree of Master of Arts

in Geography

Examining Committee:

Brian Klinkenberg
Supervisor

Jessica Dempsey
Supervisory Committee Member

Loch Brown
Supervisory Committee Member

Additional Examiner

Additional Supervisory Committee Members:

Supervisory Committee Member

Abstract

For decades, leaders in environmental governance have been directing the attention of their peers towards co-management frameworks. These participatory approaches to land management connect local communities and governments through power-sharing, and enhanced stakeholder engagement. Adaptive co-management is a distinct approach within this tradition that encourages flexibility and adaptability within environmental management through participatory governance, and an iterative, trial-by-error approach to understanding social-ecological systems. However, while the conceptual understanding of adaptive co-management has grown considerably over the years, critics have highlighted that the knowledge and representation of how this process occurs is lacking. This is particularly true regarding parkland.

To begin addressing this concern, I conducted a multiple ethnographic case-study of four community-based organizations in Vancouver, British Columbia that are engaged in the adaptive co-management of parkland alongside their regional land manager. Specifically, I aimed to: (1) explore barriers to adaptive co-management related to citizen monitoring, institutional culture, and stakeholder engagement; (2) highlight the lived experience of participants to provide a thicker description for understanding the adaptive co-management process; and (3) suggest solutions and avenues for future research.

A broad array of barriers existed for participants in this study. First, a lack of understanding regarding the quality of citizen data has led to funding shortages for citizen monitoring programs, and a regional disparity in their utilization. Second, rigid communication and information technology policies have resulted from unequal organizational growth, and an institutional fear of decentralized technology. Finally, stakeholder engagement has been reduced due to the marginalization of “outsider organizations,” and a lack of actor-level diversity on community boards. In response to these findings, I conclude this thesis with a series of five best practices that are based on suggestions emerging from the literature and my participants: These include: (1) Increased internal funding for citizen monitoring programs; (2) the use of a holistic data quality assessment framework; (3) the adoption of more flexible and transparent communication policies; (4) the adoption of an Agile information technology framework; and (5) the formalization of community-led bridging organizations to support stakeholder mediation.

Lay Summary

The adaptive co-management of parkland encourages flexibility and adaptability through community participation, and a trial-by-error approach to understanding social-ecological systems. However, current understandings of this approach suffer from a lack of studies that highlight the lived experience of participating community members. I worked with four community-based organizations and their regional land manager in Vancouver, British Columbia, and explored the barriers to adaptive co-management that they are facing in relation to citizen monitoring, institutional culture, and stakeholder engagement. Specifically, I found that a lack of understanding surrounding the quality of citizen collected data, rigid communication and technology policies, and marginalization at both organizational and personal scales were barriers to success. These findings suggest a need for a more holistic approach to funding and assessing citizen monitoring data, increased flexibility and transparency in regard to communication and technology policies, and the formalization of community organizations as centers for stakeholder mediation.

Preface

This thesis, including design, analysis and presentation, is the original unpublished work of the author. It was approved by the University of British Columbia's Behavioral Research Ethics Board, certificate number H18-01133.

Table of Contents

Abstract.....	iii
Lay Summary	iv
Preface.....	v
Table of Contents	vi
List of Tables	ix
List of Figures.....	x
List of Abbreviations	xi
Acknowledgements	xii
Dedication	xiii
Chapter 1: Introduction	1
1.1 Metro Vancouver Regional Parks Framework	1
1.2 A Brief History of the Metro Vancouver Park Partnership Initiative	3
1.3 Literature Review	4
1.3.1 The Rise of Community-Based Governance	4
1.3.2 Adaptive Management and Adaptive Governance	7
1.3.3 Ecological Monitoring, Citizen Science, and Data Quality	8
1.3.4 Bureaucracy and Institutional Rigidity	11
1.3.5 Stakeholder Marginalization	13
1.4 Research Objectives and Questions	15
1.5 Project Roadmap	16
Chapter 2: Methodology.....	18
2.1 Ethnography	18
2.2 Participant and Case Study Selection	23
2.2.1 Pacific Spirit Park Society	23
2.2.2 Burnaby Lake Park Association.....	24
2.2.3 Wreck Beach Preservation Society	25
2.2.4 Belcarra Beachkeepers.....	25
2.3 Positionality, Access, and Informed Consent.....	26

2.4	Data Collection.....	27
2.4.1	Semi-Structured Interviews	28
2.4.2	Participant Observation.....	29
2.4.3	Document Review.....	30
2.4.4	Ground Truthing and Objective Data Quality Assessment.....	30
2.5	Data Analysis	33
2.6	Methodological Limitations	35
2.7	Conclusion.....	36
Chapter 3: Barriers to Citizen Monitoring		37
3.1	Disparities in the Utilization of Citizen Monitoring	38
3.1.1	Perception vs Experience and the Use of Citizen Science Data	38
3.1.2	Board Demographics and Citizen Monitoring	40
3.1.3	Rigid Funding Requirements and the Creation of Citizen Monitoring Programs	41
3.2	Overcoming Barriers to Citizen Monitoring	44
3.2.1	Overcoming Data Quality Concerns Through Quality Assurance	45
3.2.2	A Critical Reflection on Quality Assurance and Expert Verification.....	46
3.2.3	Investigating Objective Dimensions of Data Quality in A Co-Produced Citizen Mapping Program	48
3.2.4	Subjective Dimensions of Data Quality.....	51
3.2.5	Holistic Data Quality Assessment	55
3.3	Conclusion.....	57
Chapter 4: Institutional Barriers to Communication and Technology		59
4.1	Community Development Coordinators: Gatekeepers and Facilitators of Communication	59
4.1.1	Unequal Organizational Growth and Human Resource Capacity	63
4.1.2	Interpersonal Conflict and Structured Communication Policies	66
4.2	Bureaucracy and the Slow Adoption of New Technology	69
4.2.1	A Barrier to Citizen Monitoring and Volunteer Engagement.....	70
4.2.2	Institutional Culture, the Management of Shadow Information Technology, and Stifling Innovation	72
4.2.3	A Case for Agile Project Governance.....	74

4.3	Conclusion.....	76
Chapter 5: Barriers to Stakeholder Engagement		78
5.1	A Story of Stakeholder Marginalization: The Wreck Beach Preservation Society	79
5.1.1	Voyeurism and Cameras on Wreck Beach	81
5.1.2	Empowering Stakeholders through Collaboration.....	84
5.2	Actor-Level Diversity.....	88
5.2.1	Community Representation: Old, Rich, White, and Able	89
5.2.2	Age.....	90
5.2.3	Socioeconomic Status	92
5.2.4	Race and Culture.....	94
5.2.5	Ability and Access	95
5.3	Conclusion.....	97
Chapter 6: Conclusion.....		98
6.1	Five Best Practices Emerging from the Park Partnership Initiative	100
6.2	Strengths and Limitations of Research.....	110
6.3	Future Directions and a Final Word	113
References		115
Appendices.....		128
Appendix A List of Interview Participants by Organization and Role.....		128
Appendix B Interview Scripts.....		129
B.1	Interview Script for Metro Vancouver Staff.....	129
B.2	Interview Script for Community Organization Directors and Staff.....	130
B.3	Interview Script for Community Organization Volunteers	131
Appendix C Coding and Categorization of Themes by Research Question.....		132
C.1	Coding and Categorization – Research Question 1	132
C.2	Coding and Categorization – Research Question 2	133
C.3	Coding and Categorization – Research Question 3	134
C.4	Coding and Categorization – Research Question 4	135

List of Tables

Table 2.1 Interviews by organization.....	29
Table 2.2 Field work by organization.....	30
Table 2.3 Targeted invasive plants.....	31
Table 2.4 Measurable variables, invasive species mapping	31
Table 2.5 Codes associated with the thematic category "access and diversity."	34
Table 3.1 Accuracy (%) of volunteer records by invasive species.....	49
Table 3.2 Completeness (%) of volunteer records by invasive species.....	51
Table 3.3 Categorization of objective and subjective dimensions of data quality.....	54
Table 4.1 Pacific Spirit Park Society program offerings: 2015 and 2019	64

List of Figures

Figure 1.1 Metro Vancouver Regional Parks framework.....	2
Figure 2.1 Invasive plant species infestation distribution codes.....	32
Figure 2.2 Native herb percentage	32
Figure 3.1 Holistic data quality assessment framework. Adapted from Pipino et al. (2002).	55

List of Abbreviations

B.C.	British Columbia
GIS	Geographic Information Systems
GPS	Global Positioning System
IT	Information Technology

Acknowledgements

First, I would like to thank the community members and Metro Vancouver employees who participated in this study. You took time out of your incredibly busy lives to assist me in this research, because you care so deeply for your regional parks. You are my friends, and inspiration.

I would also like to offer my sincere thanks to my supervisor, Dr. Brian Klinkenberg, and my committee members, Dr. Loch Brown, and Dr. Jessica Dempsey. Your mentorship and support, both in seminars and during my research, pushed me to think critically, write carefully, and most importantly, enjoy the process. Additionally, I would like to thank my lab mates, Emily Acheson, Peter Whitman, and Mielle Michaux for their friendship and editing efforts. While our work may take us in different directions, I feel we learned so much from one another these last two years. Further, this thesis would not have been possible without the generous financial support that I received through the SSHRC Joseph-Armand Bombardier Award, and the UBC Faculty of Arts Graduate Award.

Finally, I would like to thank my family and friends for their past, and ongoing, support. To my Mother, Father, Aunts, Uncles, Cousins, Grandparents, and neighbors, you never wavered in your encouragement, and taught me to always follow my heart. To my husband, Gary Andraza, you were a witness to both my successes and failures and saved me from more than one technical issue during my research. I love you. And finally, to my best friend, Vanessa Coady, you knew when I needed to step away, to breathe, and helped me to do both. As you enter your own graduate work, I promise to return the favor.

Dedication

For my husband, Gary Andraza, whose love and support made my return to the academy possible. Thank you for believing in me.

Chapter 1: Introduction

Since the late 1980s, environmental governance theorists have been widely directing the attention of professionals and academics towards co-management frameworks. Within such frameworks, responsibility for natural resource management is shared across a broad array of actors, including: governments, community-based groups, indigenous peoples, and even private institutions. Meanwhile, complex-systems theorists have also called for these sorts of participatory approaches, while highlighting the interrelation of personal and environmental factors through a focus on social-ecological systems. In line with these theoretical directions, I have chosen to focus on adaptive co-management in this thesis, which bridges participatory governance and complex-systems theory through multi-level, multi-organizational management, and a trial-by-error approach to field experiments that is meant to reduce the complexity of social-ecological systems. Specifically, I have taken a situated, grounded approach, to understanding some of the barriers that community-based organizations face as they participate in the adaptive co-management of urban parkland. By working with local volunteers across four community-based organizations involved in the Metro Vancouver Park Partnership Initiative, I delve into obstacles associated with three different dimensions of this adaptive co-management relationship: (1) citizen monitoring, (2) institutional culture, and (3) stakeholder engagement. I conclude with a discussion of five best practices that could be adopted by Metro Vancouver to begin overcoming these barriers in the future.

1.1 Metro Vancouver Regional Parks Framework

Metro Vancouver Regional Parks is responsible for the management of 14,500 ha. of urban greenspace, and represents twenty-one municipalities, one electoral area, and one treaty First Nation in south-western British Columbia (B.C.), Canada. Additionally, it is required to work within guidelines specified by Fisheries and Oceans Canada where beachfront is located and must ensure all management activities fall within provincially acceptable practices. Co-management organizations primarily consist of twenty-nine community-based groups, some of whom receive funding through the Pacific Parkland Foundation, which is an independent charity arm of Metro Vancouver. In total, twenty-two regional parks operate within this system, and

make up approximately four percent of the region’s entire land base (Metro Vancouver, 2016). Figure 1.1 provides a broad overview of this complex organizational structure that makes up the Metro Vancouver Regional Parks framework.

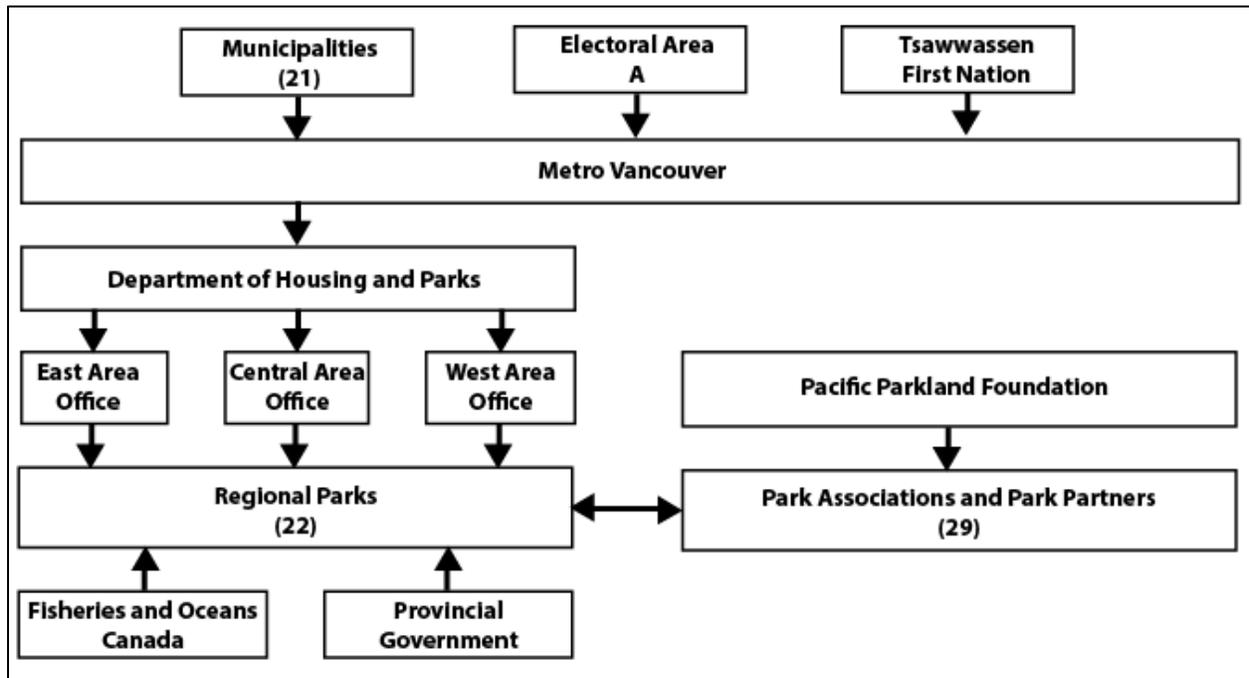


Figure 1.1 Metro Vancouver Regional Parks framework.

By 2040, Metro Vancouver will have to accommodate an additional one million people, growing to an estimated 3.5 million potential users (Metro Vancouver, 2011). This regional growth is not unexpected with 81.4% of Canada’s population living in cities today, and national trends pointing towards increasing urbanization and density in the future (United Nations, 2018). In response, regional land managers are preparing for increased pressure on natural resources. The impact on parks is expected to be greater than average as private outdoor space is minimized through densification, and residents and policymakers continue to become aware of the broad range of ecosystem services that these areas provide (Metro Vancouver, 2016). Visitation to Metro Vancouver Regional Parks has been increasing rapidly over the past eighteen years with an average annual growth rate of 4.05%, and this could lead to an increase in the number of park visits from ten million to twenty million over the next twenty years (Metro Vancouver, 2016).

This growth in usership will add to the unique challenges facing those engaged with the management and governance of parkland within the Metro Vancouver Regional District. These complex social-ecological spaces are mosaics of nature and the built environment with dense stakeholder networks – management is complicated not just by humankind’s physical imposition on the environment, but by the social pressures that people exert. In order to account for the inherent physical and social complexity of these regional parks, Metro Vancouver utilizes an adaptive co-management approach, whereby they engage local community groups to assist them in carrying out management experiments to assess best practices. Metro Vancouver’s goal is to increase public participation and stakeholder engagement through volunteer opportunities, while utilizing this additional labor to meet their goals for data collection, ecological monitoring, ecorestoration, and outreach. One of the primary ways in which Metro Vancouver is able to attract and manage this volunteer base, which contributes over 20,000 hours of volunteer labor annually, is through the Park Partnership Initiative (Metro Vancouver, 2017).

1.2 A Brief History of the Metro Vancouver Park Partnership Initiative

In 1995, the Greater Vancouver Regional District, now Metro Vancouver, envisioned a project of partnership and devolution, or the partial transfer of its responsibilities and powers to local organizations and actors. By empowering community-based groups within the regional parks system with increased decision-making power and resources, the Greater Vancouver Regional District sought to increase its efficiency and effectiveness while meeting an increasing public demand for participation in the treatment and resolution of regional park issues. The Regional Parks Committee and the Greater Vancouver Regional District Board of Directors would officially approve the creation of the Park Partnership Initiative in July 1996, and this program would consist of park associations and park partners that would in turn be supported by the Regional Parks Forum. This forum, park societies, and park partners would be operated by community members, and supported by district staff as required. Park associations would be responsible for bringing groups and volunteers within their respective parks together under one umbrella, so that these individuals could be better mobilized to organize special events, assist in education and interpretation programs, initiate restoration projects, and raise funds for park facilities. On the other hand, park partners would be those community-based groups with a

historic and/or important role to play in their regional park, but whose foci might be too specific to operate as a park association.

By 2002, the Pacific Spirit Park Society and the Kanaka Educational and Environmental Partnership Society, had reached that stage in their development where district staff support was no longer adequate to address their operating needs. A case was put forward to the Regional Parks Committee by the district's community development coordinators that a special reserve fund should be established to assist these park associations in their operations, up to a maximum of \$20,000 per year. In arguing for this support, it was reported that these two park associations had donated over \$280,000 in volunteer hours and administrative labor, and raised over \$442,000 for priority projects within regional parks that past year. The cost benefit analysis was clear, the Greater Vancouver Regional District readily agreed to invest additional funding for park associations then and into the future, based on performance and need.

Today, the Metro Vancouver Park Partnership Initiative has seven park associations and twenty-two official park partner organizations. These partner groups work closely with Metro Vancouver across four primary dimensions: (1) environmental monitoring; (2) environmental restoration; (3) environmental education; and (4) environmental advocacy and outreach. Collectively, this work functions to meet the primary mandate of the Park Partnership Initiative: protect green space and enrich communities.

1.3 Literature Review

While locally focused, this case study of the Metro Vancouver Park Partnership Initiative is illustrative of broader movements within the management and governance of natural resources and parkland. In this section I discuss the rise of community-based governance before outlining the components of adaptive co-management specifically. I follow this by reviewing three practical barriers to the utilization of adaptive co-management related to citizen science and data monitoring, bureaucracy and institutional rigidity, and stakeholder marginalization.

1.3.1 The Rise of Community-Based Governance

Natural resource governance reform through the devolution of powers from centralized governments to local actors is a trend often traced to the late 1980s. This turn to pluralism,

decentralization, and stakeholder participation was, from a ground-up perspective, a response to the driving logic behind community development and natural resource management in the post-war period. A product of two centuries of top-down, command-and-control philosophies, resource management was seen as the domain of technical professionals who had the knowledge, expertise, and thus, the right to make decisions regarding shared resources (Bocking, 2004). However, the problem was that such command and control approaches to natural resource management implicitly assumed that the questions being asked were “well bounded, clearly defined, relatively simple, and generally linear with respect to cause and effect” (Holling & Meffe, 1996, p. 329). Invariably, this was not the case, and often resulted in managers of complex social-ecological systems attempting to reduce complexity in order to make ecosystems more reliable and predictable for human use (Cox, 2016; Holling & Meffe, 1996). In other words, analytical simplification resulted in a focus on only a few “productive” outputs, usually those that could be economically assessed, so that management decisions could be made legible to those they were reported to (Cox, 2016; Scott, 1998). Consequently, this would often lead to a disempowerment of local citizens and stakeholders, as important social and community functions of the natural resource in question were stripped away.

By the 1980s, a general dissatisfaction and distrust of centralized governments to sustainably and equitably manage shared resources began to give way to calls for community-based resource management (Berkes, 1989; McCay & Acheson, 1987; Ostrom, 1990). Academics, policymakers, and citizens questioned the efficacy and legitimacy of technical professionals as they attempted to respond to the diverse and often conflicting values and interests surrounding natural resources (Bocking, 2004). By 1987, *Our Common Future*, popularly known today as the *Brundtland Report*, was delivered by the World Commission on Environment and Development. It made a decisive call for all sectors of society to be involved in consultation and decision making related to sustainable development (World Commission on Environment and Development, 1987).

In 1992, when the United Nations convened in Rio de Janeiro, at the now colloquially named Earth Summit, a new logic was prevailing among many of those engaged in the management and governance of natural resources: social-ecological systems were complex, uncertain, and displayed non-linear and self-stabilizing behavior (Berkes, Colding, & Folke,

2003; Harris, 2007). Further, the knowledge and skills needed to adequately manage and govern these systems could not be found in any one person or level of governance. The subsidiarity principle, or the idea that social and political issues related to natural resource management should include the local, was beginning to take hold in governance circles (Berkes, 2010). Such ideas would continue to prosper during the 1990s and 2000s, as the command and control methodologies of the post-war period reformed, leading to a surge in community-based governance in both the Global North and South (see. Ambus & Hoberg, 2011; Cinner et al., 2012; Forgione, Pregitzer, Charlop-Powers, & Gunther, 2016; Murray, Agyare, Dearden, & Rollins, 2018).

As Cronkleton et al. (2012) note in their discussion of forest management, this shift to locally-based governance did not mean an end to top-down governance per se; rather, the reforms that took place in the 1980s and 1990s often lead to a pluralization of governance whereby local actors were now being given the chance to co-manage alongside state or government agencies. Partial devolution, in which community-based actors were empowered with limited decision-making was much more common than a complete transfer of responsibilities. While a newly found dedication to the local provided community-based organizations room for negotiation regarding the management and governance of natural resources, state-level actors and agencies often continued to enjoy significant oversight – as is the case today.

Proponents of decentralization in natural resource management often argue that these reforms promote efficiency, equity, and responsiveness. However, there is a strong current of criticism within this literature that these goals are unlikely to be met where transferal of power is limited, or where local organizations lack capacity, legitimacy, and accountability (Berkes, 2010; Ribot, Agrawal, & Larson, 2006; Sanginga, Kamugisha, & Martin, 2010). Still, while these critiques often present case-studies in which decentralization has failed, this is usually in an effort to improve such management schemes, rather than return to a more centralized form of governance (Berkes, 2010). Some of the most promising contributions to emerge from these discussions have been those that focus on the use of adaptive management and adaptive governance. Combined, these approaches are an effort to understand the complexity inherent in social-ecological systems. Practitioners seek to sustain ecosystem services and ecological health

while simultaneously improving stakeholder engagement through integrative, multi-level management (Allen & Garmestani, 2015; Folke, Hahn, Olsson, & Norberg, 2005).

1.3.2 Adaptive Management and Adaptive Governance

First coined in 1978 by Crawford Holling, adaptive management evolved out of resilience theory. Specifically, resilience refers to the idea that more than one stable state exists for ecosystems, and that land management professionals should avoid exceeding thresholds that may shift an ecosystem into a less favorable state. Additionally, favorable states should be maintained (Allen & Garmestani, 2015; Holling, 1973). Adaptive management was developed as a method to understand the complexity and dynamics of resilient systems through the use of management experiments (C. S. Holling, 1978), and to reduce uncertainty in such management (Walters, 1986). Since 1990, and up to the present, adaptive management has also been more generally understood as “learning by doing” (Walters & Holling, 1990; Westgate, Likens, & Lindenmayer, 2013); however, it would be remiss to simply consider this as a trial by error approach. Methodologically, adaptive management is an iterative model, whereby experiments are conducted, monitored, evaluated, and then *adapted* based on the information gained through those experiments (Westgate et al., 2013).

This paradigm becomes more complex when one also considers the social dimensions of the systems being managed (Allen & Garmestani, 2015). Indeed, another key of understanding the complexity of social-ecological systems is to ensure that authentic and thoughtful engagement is occurring between land managers and local stakeholders (Williams, 2011; Wondolleck & Yaffee, 2000). Thus, adaptive governance is often combined with adaptive management.

In this context, adaptive governance is a collaborative form of environmental management that seeks to incorporate stakeholders, institutions, and other intermediaries into natural resource management decision making (Folke et al., 2005; Schultz, Folke, Österblom, & Olsson, 2015). These intermediaries, usually community-based organizations or holders of traditional knowledge, are particularly important sources of novel ideas within the adaptive management process, and even as facilitators when it comes to engaging additional stakeholder groups (Allen & Garmestani, 2015; Folke et al., 2005). When adaptive management and

governance are combined in this way, especially within multi-level governance frameworks, the term adaptive co-management is often applied (Plummer et al., 2012).

While adaptive co-management does help to solve many of the problems that community-based natural resource management is meant to address, namely the inherent social-ecological complexity of managed systems and a previous lack of local participation, it still suffers from a number of practical difficulties when being applied in the field, as highlighted in the next three sections of this literature review.

1.3.3 Ecological Monitoring, Citizen Science, and Data Quality

Land managers engaging in adaptive co-management are reliant on well designed monitoring programs to provide data on the effects of their efforts. However, such programs can be cost-prohibitive, and often suffer from technical difficulties or a lack of human resources (Allen & Gunderson, 2011; Danielsen, Burgess, & Balmford, 2005; Keith, Martin, McDonald-Madden, & Walters, 2011). In regards to these issues, citizen science is increasingly being looked at as a source for cost-effective monitoring (Aceves-Bueno et al., 2015a). Where monitoring is taking place near populated, urban areas, there is a potential to utilize a number of community groups, including students, teachers, and those who use managed areas for recreational activities (Dickinson & Bonney, 2012). Still, technical issues could be exacerbated by citizen science volunteers who are unfamiliar with research tools, methods, or collect low quality data (Burgess et al., 2017).

While the term “citizen science” is often contested, its core principal is that citizens or non-experts are participating in the design, analysis, or data collection which is required for scientific research. Where scholars differ is in how they understand the value of citizen science, and what goals this public engagement is meant to fulfill (Ceccaroni & Piera, 2017). This difference of opinion has existed since the term was separately coined in the 1990s by both Alan Irwin (1995) and Rick Bonney (1996). Whereas Irwin was focussed on the democratization of science and policy processes brought on by public engagement in research, Bonney was more interested in the practical aspects of this engagement – namely, the large quantities of data that could be obtained and the education of citizen monitors.

Within the last two decades, the use of citizen science has skyrocketed (Ceccaroni & Piera, 2017; Kosmala, Wiggins, Swanson, & Simmons, 2016). This has been due to three main reasons: (1) rapid technological advancements, and the ubiquity of global positioning system (GPS) enabled mobile devices, now allow for the collection of large and cost-effective data sets (Foody et al., 2017; Newman et al., 2012); (2) policy and management are showing an increased need for large-scale and long-term monitoring (Aceves-Bueno et al., 2015b; Conrad & Hilchey, 2011); and (3) interest continues to rise in regards to the community benefits that are provided when locals engage in citizen science (Kountoupes & Oberhauser, 2008; Riesch & Potter, 2014).

While citizen science often appears to be a panacea for adaptive co-management, literature emerging from the natural sciences shows a preoccupation towards data gathering objectives, protocols, and various forms of quality assurance (Hunter, Alabri, & van Ingen, 2013; Kosmala et al., 2016; Roman et al., 2017; Wiggins, 2013). Meanwhile, community benefits and stakeholder engagement are often depicted as a fortunate by-product, rather than a goal in and of themselves. Additionally, although citizens are engaged in data collection, they are generally left out of the most important aspects of scientific inquiry and management: hypothesis formation and analysis (Fernandez-Gimenez, Ballard, & Sturtevant, 2008; Pandya, 2012).

In terms of obstacles facing users of citizen science, data quality seems to be the most cited concern among natural resource managers. Burgess et al. (2017) found that in a survey of four hundred and twenty-three biodiversity and conservation scientists that the possibility of low-quality data was the number one reason for lack of use. Specifically, the literature highlights a number of worries, including the following: observer or sampling bias (Bird et al., 2014; Dickinson, Zuckerberg, & Bonter, 2010; Galloway, Tudor, & Haegan, 2006), a lack of quality verification (Crall et al., 2011; McDonough MacKenzie, Murray, Primack, & Weihrauch, 2017), suboptimal experimental design (Conrad & Hilchey, 2011), and ineffective training of volunteers.

However, best practices have also been developed to counter these issues. Kosmala et al. (2016) provide a wide range of suggestions, such as the use of standardized and calibrated equipment, advanced statistical techniques to counter bias, and the iterative design of tasks, tools, and training to ensure that the needs of volunteers are met. Such quality assurance methods have been suggested elsewhere in the literature and have been confirmed in multiple studies

(Dickinson & Bonney, 2012; Starr et al., 2014; Wiggins, 2013). Additionally, there are many examples of successful citizen monitoring projects which readily show that amateurs can provide high-quality data (Delaney, Sperling, Adams, & Leung, 2008; Edgar & Stuart-Smith, 2009; Roman et al., 2017).

Still, how is high-quality data defined in the literature? One definition is that high-quality data collected by citizens should match data collected by experts (Kosmala et al., 2016). However, many studies fail to provide discussion surrounding the fact that ecological data collection often relies on subjective interpretation on behalf of both volunteers and experts. Indeed, disagreements often occur *between* experts, and this raises questions as to when expert validation is appropriate and under what circumstances (Kosmala et al., 2016). At the very least, multiple experts should be shown to corroborate the standards against which volunteer data is held to (Fuccillo, Crimmins, de Rivera, & Elder, 2015).

Difficulty in determining the conditions for high-quality data is exacerbated by issues in defining data quality itself. Data quality often includes aspects like accuracy, completeness, consistency, or timeliness within its framework (Pipino, Lee, & Wang, 2002; Wang & Strong, 1996). However, this is a multi-dimensional concept, and there are hundreds of other aspects one might consider in addition to these, depending on the study (Wang & Wang, 1996). This has resulted in a lack of general agreement in the literature as to a complete list of data quality dimensions that should be considered. Sheppard and Terveen (2011) indicate that the task of defining data quality is often left up to the intuition of the researcher. My review of the literature shows that data quality is often defined within a narrow, positivist framework that lacks value-added dimensions related to its use or initial collection. As aforementioned, community benefits are often relegated to by-products within community-based monitoring, when in reality, they are often explicit goals. A data quality framework should address such needs.

Pipino et al. (2002) address this issue through their discussion of subjective and objective aspects of data quality assessment. Whereas objective data quality assessment relates to the measurements of the data set in question, “subjective data quality assessment reflects the needs and experiences of stakeholders: the collectors, custodians, and consumers of data products” (Pipino et al., 2002, p. 211). Rather than an intuitive model of data quality, a holistic data quality model relies on a product-oriented approach, whereby data quality is determined by the degree to

which said data meets the needs and goals of those who it is collected for and by (Batini & Scannapieca, 2006; Wang & Strong, 1996). Where subjective, value-added dimensions, like environmental education of volunteers, are also a primary goal of land managers, these may become as important as more objective dimensions, like accuracy, when evaluating data quality (Pipino et al., 2002).

1.3.4 Bureaucracy and Institutional Rigidity

While the need for continuous monitoring with high quality data is a concern for natural resource managers using an adaptive co-management approach, the institutional structures through which this information is filtered and utilized are equally important. As Gunderson (1999) explains, one of the central tenants of adaptive co-management is integrative learning. That is, the information one gains through various management experiments will be applied proactively and iteratively to future management decisions. While this means that the methods surrounding resource management will change over time, it also means that the organizational and institutional structures that compliment this management must adapt over time as well – a process that Ostrom (2005) calls ‘institutional learning’. Organizations engaging in adaptive co-management need to be learning based, and those that are slow to grow or adapt to new lessons due to bureaucracy, institutional rigidity, or even individual attitudes often experience management failures (Berkes, Armitage, & Doubleday, 2007; Méndez, Isendahl, Amezaga, & Santamaría, 2012; Williams, 2011).

Within the literature on adaptive co-management, bureaucracy primarily refers to the complex, administratively dense nature of natural resource management organizations (Stankey, Clark, & Bormann, 2005). The complex paths through which information flows in such organizations can impact their ability to learn from management experiments and may also result in slower communication with various stakeholder groups and other decision makers. While bureaucracy tends to complement top-down, command and control approaches to natural resource management, it is antithetical to adaptive co-management. On a related note, institutional rigidity refers to the resistance within these organizations to changing these structures, policies, or rules. This could be due to cost or internal resistance to change itself. Depending on the size or scope of the institution, multiple constraints may play a role: limited

human resource capacity, internal or external competition for funding, limited financial resources, non-flexible information technology (IT) systems, or even a lack of understanding over what adaptive co-management is (Dunning, 2017). Or, as Lee (1993) explains in her discussion of the need for improved institutional structures for the facilitation of civic science, such structures are often entrenched as their alteration is likely to lead to a change in order or power. Said change can lead to ambiguity and stress within an organization, thus it should not come as a surprise that avoidance is common amongst administrators.

While theoretically, the philosophies behind devolution, subsidiarity, and participatory science might call for natural resource management to abandon these organizational schemes, the reality is that institutions are so heavily ingrained within our management systems that they are likely to play a central role in the foreseeable future (Stankey et al., 2005). Perhaps a more practical approach would be to begin looking at increasing the flexibility of such institutions, or, as Lee (1995) calls for, more attention should to be given to the sorts of institutional structures that are required for adaptive co-management to succeed. However, as Stankey et al. (2005) argue, it is imperative that we do not allow such pragmatism to devolve into a tacit acceptance of command-and-control sensibilities. Rather, we must find new and innovative ways in which to alter institutional structures to work with adaptive co-management.

Several scholars have expanded on this, asking that increased attention be given to the multi-level management and cross-scale interactions that are inherent to adaptive co-management (Costanza, 2001; Folke et al., 2005; Folke, Pritchard Jr, Berkes, Colding, & Svedin, 2007; Young, 2002a). One topic that deserves a closer look is how the division of responsibility, tasks, and knowledge between centralized and decentralized actors can lead to a breakdown in the dynamism of cross-scale interactions in natural resource management. In this regard, bridging organizations that are able to connect community actors, traditional knowledge, local labor, etc. are of utmost importance (Danter, Griest, Mullins, & Norland, 2000; Folke et al., 2005; L. H. Gunderson, Holling, & Light, 1995; Schultz et al., 2015). Folke et al. (2005) describe these organizations, often NGOs, as “arenas for building trust, sense-making, learning, vertical and/or horizontal collaboration, and conflict resolution” (p. 461). They are also integral as they are able to help communicate and translate scientific knowledge to communities, while also calling upon the local memory and knowledge of dense stakeholder networks to facilitate

novel management techniques in times of increased uncertainty (Folke et al., 2005). Still, while a great deal of thought has been given to how these bridging organizations benefit the adaptive co-management of natural resources, a significant gap exists in the literature regarding the creation of roles within institutions themselves to serve a similar purpose.

1.3.5 Stakeholder Marginalization

While the use of bridging organizations within adaptive co-management is meant to increase communication and knowledge sharing, stakeholder marginalization remains a significant obstacle to this (Prell, Hubacek, & Reed, 2009). Stakeholders have historically been defined as those “who can affect or [are] affected by the achievement of [an] organization’s objectives” (Freeman, 1984, p. 46). However, since Freeman’s initial work on stakeholder theory, the term has been widely debated. Succinctly, this debate can be divided into: (1) those who take a narrower, instrumental approach to stakeholder theory by tying stakes directly to organizational goals, and (2) those who take a broader, normative view by tying stakes to being affected by an organization’s activity (M. S. Reed et al., 2009). Instrumental approaches to stakeholder theory tend to focus on the pragmatic act of identifying and managing stakeholders, while normative approaches are more interested in the debate of who should be involved in decision making at all (M. S. Reed et al., 2009).

While broad understandings of stakeholder networks may seem conducive to the participatory nature of adaptive co-management, there is also a worry that as stakeholder networks grow in complexity, prolonged disagreements between stakeholders or managers at various governance levels may lead to lengthy decision making or even a failure to act (Gregory, Ohlson, & Arvai, 2006; Westgate et al., 2013). However, there is a difference between defining stakeholders and identifying stakeholders. Even broad approaches to stakeholder analysis rely on a process of ranking various stakeholder groups, usually in terms of urgency and power (Mitchell, Agle, & Wood, 1997).

Reed’s (2008) extensive review of the literature on stakeholder participation in natural resource management provides eight rules of best practice for overcoming many of these issues faced by those seeking stakeholder participation: (1) Participation should empower while promoting equity, trust, and learning; (2) participation should be sought early on in the process;

(3) a system for stakeholder identification should be used; (4) clear objectives for participation should be determined early on; (5) methods should be tailored to specific management questions; (6) stakeholder facilitation is essential; (7) local and scientific knowledges should be integrated; and (8) participation should be institutionalized. While Reed's (2008) recommendations are quite general, their usefulness comes from the fact that he has chosen to look at stakeholder participation as a process. Unfortunately, such frameworks for stakeholder participation have not been readily taken up within the literature, primarily due to their complexity (Talley, Schneider, & Lindquist, 2016).

Moving from the general to the specific, multiple case studies in adaptive co-management have indicated a range of factors leading to stakeholder marginalization. Investigations into the CALFED Bay-Delta Program, a department within the government of California that works with Federal officials to tackle state-wide water management issues, have indicated that policy has been co-opted by urban users, agricultural lobbyists and mainstream environmental groups (Kallis, Kiparsky, & Norgaard, 2009; Shilling, London, & Liévanos, 2009). Low-income groups, people of color, indigenous communities, and radical environmentalists have been ignored, or placed within peripheral working groups with little influence on decision making to ensure that the needs of more dominant stakeholder groups are met (Kallis et al., 2009; Shilling et al., 2009). This issue is exacerbated by low-levels of representation for such groups within these dominant organizations. This finding is in agreement with the literature more generally: rather than democratizing governance and management, co-governance can simply strengthen those who already possess greater access and expertise navigating these sorts of relationships (Bondy & Charles, 2018; Kusters et al., 2018; Swyngedouw, 2005). Additionally, where there are significant value disagreements between land managers and stakeholders, faux participatory mechanisms, such as the peripheral working groups aforementioned, may be used to maintain legitimacy through "public participation" for the land manager, while actively undermining this goal in reality (Kallis et al., 2009).

Finkbeiner and Basurto's (2015) discussion of the co-management of small-scale fisheries in Northwest Mexico offers some simple, yet effective ways to help prevent the type of stakeholder marginalization seen in the CALFED case-study. Within Northwestern Mexico, small-scale fisheries have historically been marginalized when it comes to participation in wider

policy development. In order to counteract this, their historic peripheralization was calculated by state-level actors as a sign that they should be included in the co-management process. That is, land managers counteracted stakeholder marginalization by reversing the standards for stakeholder involvement, choosing to prioritize those whose voices were less likely to be heard due to systemic marginalization (Finkbeiner & Basurto, 2015). The case is also made for bridging organizations once more, though in this study the concept is operationalized as a way for stakeholder groups that already enjoy a seat at the table to empower less fortunate organizations who are still going to be affected by management decisions (Finkbeiner & Basurto, 2015). The wider literature certainly supports the notion of stakeholders helping stakeholders (Berkes, 2009; Lockwood, Davidson, Curtis, Stratford, & Griffith, 2009; M. S. Reed, 2008). The concept of bridging organizations is raised as a way to facilitate the stakeholder engagement and communication necessary when using an adaptive co-management approach.

Within the context of this thesis, park associations, and park partners to some extent, are operating within this very important role. As I will show in the coming chapters, these community-based organizations are quite susceptible to many of the obstacles to adaptive co-management that have been outlined in this literature review. Unfortunately, this literature is lacking in its discussions of park management, specifically. Further, though calls for interdisciplinarity are made (Berkes, 2010), topics emerging from fields like citizen science, and institutional theory have been poorly incorporated.

1.4 Research Objectives and Questions

The objectives of this research are to provide practical recommendations for those engaging in the adaptive co-management of urban parkland, while complementing the existing literature through an interdisciplinary focus on citizen science and institutional theory. The ethnographic and case-study methods I have chosen to employ in this thesis have also resulted in a ground-up, locally based assessment of adaptive co-management. This will help to ensure that my recommendations are provided at an appropriate scale to meaningfully impact the management experiments being undertaken within Metro Vancouver Regional Parks.

Given these goals, and aforementioned gaps in the literature, this investigation will examine four interrelated research questions:

1. How are obstacles pertaining to data collection, quality, usage, and dissemination impacting adaptive co-management, and how are they being addressed?
2. How are obstacles stemming from institutional rigidity and bureaucracy impacting adaptive co-management, and how are they being addressed?
3. How are interpersonal, organizational, or inter-organizational differences (inequalities) impacting adaptive co-management, and how are they being addressed?
4. What recommendations might be made to increase the efficacy of the adaptive co-management of parkland as these community-based organizations engage in restoration, monitoring, education, and advocacy work?

1.5 Project Roadmap

This thesis is divided into six chapters, followed by appendices. Following this introduction, I discuss the intricacies of my grounded approach in Chapter 2 by discussing my research methods in relation to the requirements of thoughtful ethnography and case study design. Following this I provide an overview of my participant selection process, and the four community-based organizations taking part in this study are biographed. Finally, data collection methods are reviewed, along with a discussion of my mode of analysis.

In Chapter 3, I discuss multiple barriers to the utilization of citizen monitoring in Metro Vancouver Regional Parks. Specifically, I look at how a perceived lack of data quality, a lack of interest by boards who are focused on more traditional forms of co-management, and rigid funding requirements have limited the ability of partner groups to produce this sort of programming. Additionally, I look at how verification of objective dimensions of data quality, like accuracy and completeness, might counter the false assumption that citizen monitoring produces low quality data. Finally, subjective dimensions of data quality are explored, and I show how their incorporation into a holistic data quality assessment framework can provide a fuller evaluation of citizen monitoring.

In Chapter 4, I explore institutional barriers to communication and technology. First, I discuss the role of community development coordinators as both a facilitator and gatekeeper for communication between partners organizations and Metro Vancouver staff. In particular, I discuss how the restrictive communication policies that result in this position's gatekeeper role have been exacerbated by interpersonal conflict and unequal organizational growth. Next, I explore how rigid IT policies are stifling innovation due to Metro Vancouver's fear that department level development of new technologies will result in system instability. Finally, I explore how the use of Agile IT, which is a more flexible form of IT management may be used to overcome this barrier.

In Chapter 5, I examine obstacles to participation and stakeholder engagement as Metro Vancouver seeks to engage in the adaptive co-management of regional parks. First, I explore the topic of stakeholder marginalization, by examining the difficult relationship that exists between the Wreck Beach Preservation Society, other beach users, and Metro Vancouver. Specifically, the notion of "othering" within stakeholder networks is discussed before I examine how the use of bridging organizations as sites of mediation and conflict resolution can help to overcome such issues. Finally, I discuss the lack of actor-level diversity on the boards of partner organizations and look at how this can impact stakeholder engagement.

In my concluding chapter, I summarize my findings and discuss broader trends that I observed throughout my discussions in Chapters 3 through 5. Additionally, I provide five rules of best practice emerging from these findings and discuss how these might be operationalized within the Park Partnership Initiative and other regional park networks. Next, I discuss the strengths and limitations of this study, before ending this thesis with a discussion of future directions.

Chapter 2: Methodology

The study of co-management approaches to natural resource management is notoriously difficult, particularly due to the complexity of these arrangements. Not only does such research have to cross organizational borders, but those involved within co-management frameworks exist at different scales of formal and informal governance (Carlsson & Berkes, 2005; Ming'ate, 2014). Typically, research has either focused on specific case-studies that show the wide range of common-pool resources that might benefit from this form of management, or top-down empirical work that seeks to build sustainable systems of management (Carlsson & Berkes, 2005). I differ in my approach by conducting a situated, grounded analysis of adaptive co-management, while suggesting best practices at local and regional scales.

This thesis is best described as a multiple ethnographic case study. Four organizations were explored alongside Metro Vancouver Regional Parks as I sought out barriers to success for those engaging in the adaptive co-management of parkland. I chose to utilize ethnography and case study design, because I wanted to ensure that the richness and complexity of local experiences were central to my analysis. In collecting stories and data on those obstacles facing community-based organizations engaged in adaptive co-management, I used a purposive sampling method to choose the most information rich cases available. I employed participant observation and semi-structured interviews in my collection of primary data, and secondary data was gathered through a review of organizational documentation and ground truthing. This secondary data was used to develop a more comprehensive understanding of my research questions, while enhancing the validity of my findings through methodological triangulation. Audio records from interviews were manually coded using Nvivo software, crosschecked with field notes, and this was followed up by an analysis of key themes that I used to guide my discussion.

2.1 Ethnography

Ethnography has been broadly described by theorists like Spradley and McCurdy (1972) as “the task of describing a particular culture” (p. 5). However, the contemporary use of ethnography has moved beyond this methodology’s traditional focus on small, isolated

communities, towards a more topic-oriented approach that focuses on particular aspects of social networks, such as: institutions, organizations, or cultural movements (Harrison, 2018; Spradley, 1980). Generally, ethnography utilizes participant observation, field notes, and interviews; however, these methods do not make up the methodology itself, or the set of prescriptive norms within this research tradition (Marshall & Rossman, 2016). Compared to other qualitative methodologies, the strength of ethnography in the study of adaptive co-management is in its ability to highlight values, beliefs, and other aspects of institutional culture that help to contextualize social action (Maggs-Rapport, 2001). This context aids in the development of numerous frames of understanding, which can help to unearth complex systems of meaning when the cultural worlds of multiple participants are mediated by the researcher (Maggs-Rapport, 2001).

While conducting my research for this thesis, I followed Ming'ate's (2014) discussion on combining ethnography and case study design in the research of forestry co-management approaches. Specifically, I focused on incorporating seven key features of thoughtful ethnography that he adapted from Maggs-Rapport (2001). These included: (1) A holistic view towards describing culture; (2) a focus on meanings people give to their cultural world; (3) utilizing the researcher as the primary data collection instrument; (4) lengthy periods of field work; (5) a concentration on interaction, observation, and speech; (6) a focus on socio-cultural systems; and (7) the utilization of rich points.

Holism, as an important aspect of ethnography, is best understood through Geertz' (1973) discussion of thick description in his oft cited article of the same name. Geertz suggests that the difference between "thick" or "thin" description is dependent on the degree to which behavior is contextualized within the greater socio-cultural systems that it is embedded in. That is, if I described someone as blinking their right eye, this would be an example of thin description from which little meaning could be gleaned. On the other hand, if I were to describe that same person as winking at me over a smoky bar table, multiple empty glasses of wine between us, this would be an example of thick description from which one might choose to attach several meanings due to the context provided.

In my research I sought out two ways by which I could provide high levels of contextualization. First, I took detailed field notes, paying attention to what people were wearing,

my surroundings, the nature of interruptions, and any body language used. Second, I chose to code raw audio, instead of transcripts. While this is not a common choice to make in ethnography, my reasoning behind coding raw audio was twofold: it saved time, but more importantly, it allowed for intonation to more readily show meaning and sarcasm. These efforts to contextualize my observations and recordings are an integral part of thoughtful, ethnographic practice, because it is often the context one includes in a study that will determine the amount of engagement that they can expect from readers. That is, holistic approaches to understanding observed behaviors is important to one's analysis, but also to engagement with other academics after research is completed.

Regarding the second of these seven features, a focus on the meanings that participants prescribed to their work or volunteerism within the co-management of parkland was also important to understanding many of the barriers discussed in this thesis. Community members take up this work for a variety of reasons, such as community, friendship, and skill development; however, their understanding of how this work fits into the wider co-management framework can often differ from the understandings of their fellow volunteers or the professional land managers at Metro Vancouver. Lacking clear goals or shared understandings of institutional flows or practices can generate confusion, impede communication, and exacerbate cases of stakeholder marginalization, as I will discuss in the upcoming chapters. Throughout my interviews, and general discussions, I consistently wove in questions or topics surrounding the meanings and goals behind programs that participants were engaged in. I sought out areas where there was disagreement and cross-checked this information with documentation such as: program guides, board meeting minutes, and planning documents. By discussing disparities with participants after the fact, usually at an event as I did not have the resources to conduct follow-up interviews, I was able to pinpoint those barriers for which misunderstandings or miscommunication were root issues. Due to many of these misunderstandings being outwardly characterized by social conflict between one or more participants, I often found myself in the role of mediator as well, which provided me a central vantage point from which to interpret these findings.

The utilization of the researcher as the primary mechanism of data collection, usually through participant observation, is also a staple of ethnography, and tied to the fourth, fifth, and

sixth components of thoughtful ethnographic practice discussed by Maggs-Rapport (2001): extensive field work, a focus on interaction, observation and speech, and socio-cultural systems.

While conducting this study, I focused on participating in as many different organizational activities as I could. Additionally, I tried to involve myself in the day-to-day conversations that participants were having at events, while at the same time linking their central topics back to more general theoretical discussions in my field notes. I took particular interest in how the members of community-based organizations interacted with one another, as well as with other stakeholders and the general public. I was pleasantly surprised that through the viewing of these day-to-day interactions that some of the most interesting and complex themes emerged in this thesis.

I also took time at events to take a step back and analyze my own position in relation to the interactions I was observing. After all, as data collector, observer, and participant, there is no way for an ethnographer to claim independence from the study they are undertaking (Harrison, 2018). In my case, this is doubly true, as I am a member of the community under study. A particularly important piece of advice I followed was included in Marshall and Rossman's (2016) text on designing qualitative research: it is important to the validity of ethnographic studies that the researcher participate, but rarely initiate. That is, while it is necessary to participate to promote empathy and understanding in relation to a study, by doing so the ethnographer is mutually implicated in the production of that knowledge being gathered – this impact is lessened if the ethnographer takes on the role of participant, rather than leader. By following this suggestion throughout my fieldwork, I felt that the interactions I observed were less a product of my own presence, and more likely to have naturally emerged out of the situations in which I found myself.

Perhaps the greatest challenge for this study, directly connected to this participant observation, was the amount of time it took to collect my data. A thoughtful ethnography provides a synthesis of participant data and complex socio-cultural systems (Harrison, 2018), and no researcher can expect this to happen overnight. Further, participant observation is a highly ineffective way to collect data if those around you lack trust in your reason for being there and may result in nervousness on their part or a departure from regular routines (Harrison, 2018). Simply put, trust takes time, and from my experience in the field, also goes hand-in-hand with

familiarity and friendship; though, this will not be the case for all researchers depending on the nature of their inquiry. Even in my instance, where seven months were spent observing and interviewing participants, I was glad to have an additional four years of non-academic contact with my participant organizations during which I was able to foster authentic relationships prior to my research. Of course, this is not a luxury that everyone can be afforded, and shorter periods of time in the field are now a reality for many ethnographers who adapt by limiting the scope of their research questions accordingly (Harrison, 2018).

I too limited the scope of my research questions based on my review of the literature and past experiences with the Metro Vancouver Park Partnership Initiative. While this provided necessary direction for my thesis, I am also cognizant that the most thoughtful ethnographies allow for the emergence of novel ideas as they naturally occur (Maggs-Rapport, 2001). The question is: to what degree can limits be applied, while also allowing for novel ideas to flourish? Stern and Porr (2011) provide a thoughtful answer to this question in their practical approach to grounded theory, or an inductive methodology whereby it is encouraged that themes and research questions systematically emerge from collected data. They explain that a primary review of the literature is necessary to traverse the theoretical complexities that one's thematic data will illuminate. The key to allowing for emergent themes is flexibility, and a willingness to incorporate new findings into one's conceptual framework (Stern & Porr, 2011). Often, this may even result in a researcher revisiting and altering their research questions throughout the course of a study (Agee, 2009; Stern & Porr, 2011). This was certainly the approach I took while producing this thesis, and it was through an iterative development of my research questions that I chose to focus on barriers pertaining to citizen monitoring, institutional culture, and stakeholder engagement. Additionally, I moved from simply asking how these organizations were impacting adaptive co-management, to seeking out what recommendations for best practices might be gleaned from my time in the field. While I initially thought that broad research questions were necessary for the emergence of novel themes, this was a mistake on my part. Rather, one must structure their research questions to allow for an appropriate depth of discussion while incorporating the experiences of those they meet in the field to evolve their understanding. Doing so results in a more robust, and nuanced understanding of the phenomenon in question.

Finally, the use of rich sources is the last component of ethnography that I would like to reflect on. Practically speaking, with a total of twenty-two partner organizations and seven park societies, an information rich sub-set of these community groups was necessary to conduct a thoughtful analysis within my allotted time-frame for this thesis. As case-study research pairs particularly well with ethnography, tending to favor intensity and depth while close attention is paid to contextual analysis (Marshall & Rossman, 2016), this seemed to be an obvious methodological accompaniment. A detailed description of how these rich points, or cases, were chosen is the subject of the next section.

2.2 Participant and Case Study Selection

The selection of participant organizations for this study was purposeful, with park societies and park partners chosen based on the degree to which they were information rich sources. At the start of this study, I met with three Metro Vancouver community development coordinators, who I knew as the primary point of contact between Metro Vancouver and the twenty-nine community-based organizations taking part in the Park Partnership Initiative. After a discussion of the roles each of these organizations were playing in the adaptive co-management of regional parks, I decided on four to include as case-studies in this thesis.

Collectively, these cases represented organizations that were participating in four primary roles: environmental restoration, monitoring, education, and advocacy. Additionally, these organizations worked with the west and central area offices of Metro Vancouver, which have the highest number of park visitors within the regional park system (Metro Vancouver, 2017). A preliminary discussion on organizational age, board health, and the number of events that each of these organizations were running, also factored into my decision making. That is, I sought out those organizations that would provide the greatest opportunity for participant observation, as well as those with an extensive history with the Metro Vancouver Park Partnership Initiative.

2.2.1 Pacific Spirit Park Society

The Pacific Spirit Park Society was formally incorporated as a non-profit organization in 1998. Unlike some other park societies with long-standing histories, the Pacific Spirit Park Society was specifically created for the Park Partnership Initiative. Members of over 30 disparate

groups opted to create it, so that a single organization could act as a primary point of contact for Metro Vancouver in Pacific Spirit Regional Park. Like other park associations in the region, the Pacific Spirit Park Society acts as a public steward and a community portal for various stakeholders. They also provide a way for park users to participate in restoration work and data collection, as well as offering environmental education through a variety of nature interpretation programs for children and adults. The Pacific Spirit Park Society is currently the most active member of the Park Partnership Initiative, with fourteen programs and over 1,500 volunteers. Further, they service the largest of Metro Vancouver Regional Parks, with over 2.5 million people visiting Pacific Spirit Regional Park every year (Metro Vancouver, 2017). Administratively, the Pacific Spirit Park Society is run by seven to fifteen volunteer directors from the local community who manage a number of independent contractors that run the society's programs.

2.2.2 Burnaby Lake Park Association

The Burnaby Lake Park Association has a particularly long history of connecting local people to their regional park. In 1972, thirty interested friends, many of them teachers, created the Burnaby Outdoor Education Association. By 1995, they had raised over 1 million dollars in Federal job creation grants that employed local college and technical school students to create the vast network of trails that now provide access to the park itself (Burnaby Lake Park Association, 1995). In 1996, they would formally join the Park Partnership Initiative, and would become known as the Burnaby Lake Park Association moving forward. Though trail building has been completed, this organization now works alongside Metro Vancouver to remove invasive plant species and provides nature interpretation to park users. They also run the largest bird box program within the Metro Vancouver Regional Parks System with hundreds of human-made nests, carefully maintained and monitored by community volunteers. Collectively, the Burnaby Lake Park Association is run by seven to twelve volunteer directors and one paid staff member that coordinates the society's programming.

2.2.3 Wreck Beach Preservation Society

Though officially registered with British Columbia in 1988, the Wreck Beach Preservation Society has been advocating and fighting for this 7.8 km clothing-optional space since 1974. Impressively, its goals have remained unchanged: preserve Wreck Beach in as nearly a natural state as is possible while promoting a naturist (nudist) lifestyle. As an advocacy organization, the volunteer directors who lead this society are not involved in many of the restoration or monitoring initiatives that other park partners are. Rather, they are heavily involved in local housing development politics, and educating the public on naturism and beach etiquette. Most notably, this organization was responsible for halting a multi-million-dollar development project by the nearby University of British Columbia in 2004, eventually forcing them to lower the height of new residential towers to protect the natural views from Wreck Beach (Woolley, 2008). This “war of the towers” catapulted the Wreck Beach Preservation Society into the limelight, and since then they have been a powerful stakeholder within Pacific Spirit Regional Park.

2.2.4 Belcarra Beachkeepers

The Belcarra BeachKeepers program was created by Metro Vancouver in 1995 after Belcarra residents raised concerns about the amount of illegal crabbing and reckless beach activity that was occurring at Belcarra Regional Park. The effect of this behavior on the intertidal ecosystem could have been disastrous if this activity was allowed to continue. The Belcarra Beachkeepers promote awareness, conservation, and stewardship through environmental education, and a citizen science study. Their study monitors and collects base-line data on the Dungeness and Rock Crab populations at the Belcarra Wharf. With partnership from the Department of Fisheries and Oceans Canada, this program has grown substantially, and now has over 300 volunteers who have collectively contributed 10,100 volunteer hours since 1995. In terms of program administration, a Metro Vancouver Interpretation Specialist is assigned to lead the program annually.

2.3 Positionality, Access, and Informed Consent

I have been involved with the Park Partnership Initiative for the past four years, well beyond the length of this study. Specifically, I have sat on the Pacific Spirit Park Society Board of Directors as Secretary, President, and now Treasurer. I have also given regional talks and worked towards empowering this community through technology and administrative practices that I have learned throughout my professional life. Finally, I have also cultivated close working relationships, and even friendships, with members of the Park Partnership Initiative. In short, I am an insider, or a researcher with a direct connection to my research setting (Robson, 2002).

There are a number of benefits to being an insider when conducting research. Generally, access to study participants and events was far less time consuming, and my previous familiarity with the Park Partnership Initiative allowed for the integration of undocumented historical context when synthesizing information (Heslop, Burns, & Lobo, 2018). Additionally, my pre-existing relationship with Metro Vancouver allowed me access to this organization to begin with. As one of my participants from Metro Vancouver explained to me during a car ride back from an event, “We weren’t going to say no to the guy who volunteered over 800 hours of his time to us last year!”

Pre-existing friendships also meant that I was more likely to spend time with my participants and interviewees regularly, and not always in a research setting like a boardroom or park event (Taylor, 2011). These less formal settings often allowed for a more natural flow of conversation, and gossip, while also giving me ample opportunity to clarify topics that came up in interviews or during my review of documentation. Those that I had the closest relationships with were able to act as key informants as well, providing background information to events and topics that I would not have otherwise been privy too. For example, the community development coordinators for the west, central, and east area offices of Metro Vancouver Regional Parks were particularly helpful in choosing which organizations I should approach to take part in this study. They were far better acquainted with ongoing conflicts at the board of director level, staffing issues, or even legal problems that these organizations might be experiencing. In addition, they were able to provide documentation and memos from the mid-1990s that were integral to my understanding of the Park Partnership Initiative. This information, in computerized form, had long been lost to broken hard drives and scratched CDs.

Regardless of these benefits though, there are several problems that have arisen due to my positionality. Taylor (2011) describes how friendships and previous relationships with research participants can be unstable due to role confusion, conflict, and even betrayal. Though I did not encounter these issues, I was particularly concerned about the limits to which I could report on topics told to me in confidence. This was not just out of concern for my ongoing friendships and working relationships; rather, I also wanted to ensure that my participants were being treated with the respect that they deserve. My approach, which I found quite effective, was to disclose the full nature of my research, and to ensure that verbal consent was always obtained before reporting on personal communication.

Finally, my position as a leader within this community also brought up several issues surrounding consent when designing this study. Specifically, I had a vested interest in these organizations taking part, and I did not want a power dynamic between myself and these organizations to impact their autonomy when deciding whether or not to participate. Therefore, I asked the board of directors for each participating organization to make a decision regarding their involvement without me in the room. Each was provided a fifteen-minute presentation regarding my study and an information flyer to ensure they were acquainted with my research questions and objectives, prior to voting. In the case of the Pacific Spirit Park Society, I had my vice-president bring up the motion and I did not vote due to a conflict of interest as both researcher and president of the society. Similarly, all interview participants were provided with an information flyer if they chose to accept it, and asked to wait a period of twenty-four hours before accepting or not accepting my invitation to participate. A written consent form that outlined issues pertaining to confidentiality and the use of participant data in future research was obtained from those who took part in formal interviews. All participants were told that they could withdraw their consent at any time.

2.4 Data Collection

As mentioned previously, multiple data collection methods were used in this study to provide a strong foundation from which to triangulate my findings during the analysis phase. All aspects of this study utilized semi-structured interviews, participant observation, and document

analysis; however, ground truthing of participant data was only used in my investigation of the objective quality of citizen science data in Chapter 3.

2.4.1 Semi-Structured Interviews

Thirty-two semi-structured interviews, lasting approximately one hour each, were conducted across all four community-based organizations and Metro Vancouver during the course of my research. A semi-structured interview is a compromise between a structured interview, in which all questions are pre-determined with no deviation from these by the researcher, and an unstructured interview, in which few questions are predetermined and conversation is allowed to flow naturally (Marshall & Rossman, 2016). That is, a semi-structured interview allows for the use of a guiding script, while the researcher is also encouraged to probe the participant with additional, unscripted questions based on their answers (Marshall & Rossman, 2016).

I chose to use semi-structured interviews in this study as they provide a great deal of flexibility for researchers using a mixed methods approach. In particular, this method is useful for fine-grained qualitative analyses, because it is flexible enough to explore novel experiences and insights expressed by participants, while also including questions informed by theory (Galletta, 2013). In short, semi-structured interviews provide comparable data, while still allowing for open ended questions that can help stimulate the emergence of novel themes.

The majority of the interviews used in this study were taped with a digital audio recorder, except for six where audio recording was not possible due to background noise, or because the participant indicated that they were uncomfortable with their voice being recorded. When a recording could not be made, notes on the answers provided by participants were taken down in my field journal. Practically speaking, I designed role-based scripts with ten questions each. In the course of a one-hour interview, I found this to be a reasonable number of questions to explore, while also allowing interviewees time to follow up with novel tangents or topics of their own. For a list of interview participants by role and organization, please see Appendix A. Meanwhile, for interview scripts, please see Appendix B.

The number of interviews conducted per organization depended on its size and the willingness of its members to participate. In the case of the Belcarra BeachKeepers, however,

few formal interviews were conducted as the majority of participants were under the age of eighteen, and not covered by the ethics certificate provided for this study. Table 2.1 details the total number of interviews by organization.

Organization	Interviews
Pacific Spirit Park Society	9
Burnaby Lake Park Association	9
Wreck Beach Preservation Society	4
Belcarra BeachKeepers	3
Metro Vancouver	7

Table 2.1 Interviews by organization.

2.4.2 Participant Observation

While semi-structured interviews allowed for an exploration of how participants felt, thought about, or interpreted barriers, participant observation allowed me to witness, first-hand, the day to day operations of community-based organizations as they worked alongside Metro Vancouver, other stakeholders, and the general public. As DeWalt and DeWalt (2011) argue, however, participant observation is more than just taking part, or watching and notetaking. It is also more than just the extraordinary activities that one witnesses, like protests or celebrations. Rather, participant observation is grounded in extensive time spent in the field, conducting routine, daily actions alongside study participants.

In total, I attended forty-five separate events. Laughing, working, and sharing alongside participants provided me with a sort of tacit understanding that less participatory methods would not have allowed for. That is, as I worked alongside volunteers pulling weeds, counting invasive species, or measuring crabs, I was provided a chance to learn about the internal dynamics of the many groups I had the privilege of working with during this study. Even as an insider, I witnessed many things that my role as a director would not normally have afforded me. This not only increased the quality and interpretation of my data, but also encouraged the development of new themes and hypotheses that might not have been possible otherwise.

Events ranged from board meetings and joint working groups to invasive species pulls and educational pop-ups. One hundred and ninety-one hours were spent in the field. The degree

to which this time was divided across the organizations involved in this study was largely due to the number of events each organization had scheduled during the last three quarters of 2018, and the size of their volunteer base. Table 2.2 shows the total number of hours spent observing each organization’s events.

Organization	Field Work (hrs)
Pacific Spirit Park Society	77.5
Burnaby Lake Park Association	37
Wreck Beach Preservation Society	48
Belcarra BeachKeepers	16
Metro Vancouver	12.5

Table 2.2 Field work by organization.

2.4.3 Document Review

Document review was primarily used as a source of fact-checking and historical context when utilizing information gathered through interviews and participant observation in this study. A minimum of twenty-four months of board meeting minutes were obtained for the Pacific Spirit Park Society, Burnaby Lake Park Association, and the Wreck Beach Preservation Society. Each contained a record of a board vote, indicating the authenticity of the information provided within them. Additionally, programming guides, societal by-laws, and memos were collected to help in understanding the rules and best practices that have been set-up and agreed to by each community-based organization as they operate alongside Metro Vancouver.

2.4.4 Ground Truthing and Objective Data Quality Assessment

Ground-truthing, or on-the-ground verification of information by a researcher, was used to ascertain the accuracy and completeness of citizen science data when compared to that collected by experts in this study. Specifically, data collected by the Pacific Spirit Park Society’s Invasive Species Mapping Program was used, and a subset of three hundred and fifty-three infestation records were investigated. Volunteers collecting monitoring data were asked to walk in groups of two, and to locate specific invasive plant infestations (Table 2.3, p. 31) out to their viewshed, or their sight limit from the edge of trails. They recorded infestation locations using a

Garmin 64S GPS, and measured required variables by using the Kobo Collect form application. Table 2.4 lists the variables they were tasked with recording.

Latin Name	Common Name	Code
<i>Hedera helix</i>	English Ivy	HB
<i>Ilex aquifolium</i>	English Holly	EH
<i>Prunus laurocerasus</i>	Common Laurel	LC
<i>Rubus discolor</i>	Himalayan Blackberry	HB
<i>Rubus laciniatus</i>	Evergreen Blackberry	CB
<i>Vinca minor</i>	Common Periwinkle	CP
<i>Daphne laureola</i>	Spurge Laurel	SL

Table 2.3 Targeted invasive plants.

Variable	Description	Categories
Species Code	The code identifying the invasive plant (Table 2.3)	EI, EH, LC, HB, CB, CP, SL
Point radius or line depth	The measured radius of the infestation or the depth of the line (in meters).	
Direction from trail	The compass direction of the infestation while standing at the trail or road edge.	N, NE, E, SE, S, SW, W, NW
Distribution code	The code which best describes how the infestation is distributed (Figure 2.1, p. 32).	1, 2, 3, 4, 5, 6, 7, 8, 9
Proximity to stream	The distance of the infestation from a stream (in meters).	<1m, 1-5m, 10m+
Vegetation layer	The canopy layer that the infestation is found in.	Herb, Shrub, Tree, Mixed
Native herb cover	The native herb percentage (%) cover beneath the infestation from plot center to the drip line (see. Figure 2.2, p. 32).	0-5, 6-25, 26-50, 51-75, 76-100

Table 2.4 Measurable variables, invasive species mapping

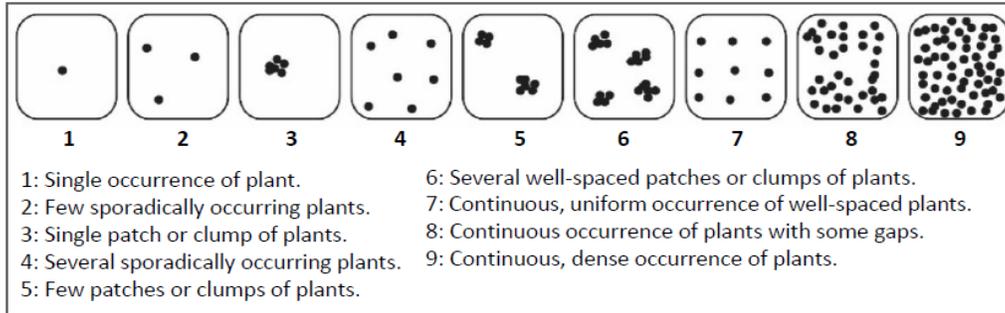


Figure 2.1 Invasive plant species infestation distribution codes.

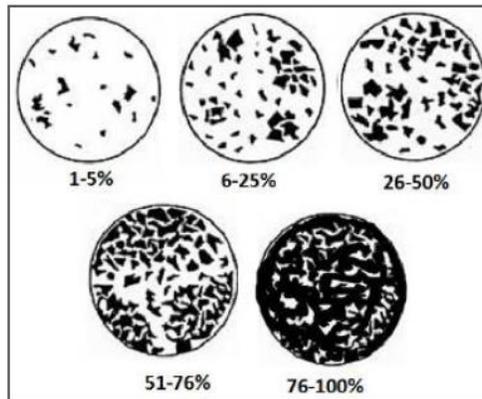


Figure 2.2 Native herb percentage

To determine the objective data quality of infestations recorded by volunteers, areas where they indicated an invasive plant infestation was present were revisited using location data, and all variables were either verified or re-measured within one month of initial collection. Where an infestation of a plant species could not be located, that record was determined to be a misidentification. As waypoints were automatically assigned when the location was marked by the GPS unit, mis-identification was deemed more likely than an incorrectly marked site.

For each variable, accuracy was determined as that percentage of volunteer observations which matched the expert's observations. However, point-radius and line-depth were also assessed a positive or negative value: positive if the measurement overestimated the area of the infestation, and negative if this area was underestimated. Additionally, point-radius and line-depth values were noted as accurate if they were within 0.2 meters of the expert's measurement. This was determined to be an acceptable threshold of error by Metro Vancouver technicians.

Similarly, volunteer records regarding native herb cover percentage were deemed accurate if they fell within 1 grade of the expert's assessment.

Completeness, or the total number of infestations found by volunteers compared to the total number of infestations found by the expert while conducting the same field-walk, was also calculated by species. The total number of species found by the expert was considered the true value, and the total number of occurrences for each species as recorded by volunteers was calculated as a percentage of that true value.

Finally, a subset of 120 records were verified by an additional expert to ensure that the findings of the primary-expert were a reasonable standard by which to judge volunteers. Both experts had comparable levels of education in the same field (Geography), and had been working with the invasive species mapping program since its creation. For all variables, the proportion of observations that were consistent between experts was reported as a percentage of the total number of observations (the "consistency rate").

2.5 Data Analysis

An iterative, ongoing coding of my data was central to my thematic analysis in this study, which I in turn used to answer my research questions. Twenty-six audio records, and transcribed notes for six unrecorded interviews, were manually coded using NVivo 12 software. This served the purpose of combining my data into blocks that could be grouped and regrouped in order to consolidate meaning.

My first pass of coding was completed while still conducting fieldwork, and the resulting codes were used to capture the essence of large lumps of audio or text. Where I was unsure of the meaning or context associated with a selection of audio or text, field notes and organizational documentation were used, alongside informal discussion sessions with participants, to provide clarity. This ongoing coding of data during field work was incredibly important when determining if a sufficient number of interviews had been reached. That is, as interviews began to provide fewer and fewer novel codes, this signaled that a point of thematic saturation had been reached. Second and third phases of coding were conducted after my field work was completed and were used to refine my initial codes. At this point in my analysis, my codes were grouped by research question, and thematic categories were determined by grouping multiple codes together

for final analysis and discussion. For example, Table 2.5 shows the codes associated with the thematic category *Access and Diversity*, which I discuss in Chapter 5.

Code	Cases	Sources	References	Thematic Category
Homophobia	3	3	5	Access and Diversity
Racism	4	12	21	
Xenophobia	4	13	18	
Age Gap	4	24	42	
Misogyny	3	3	6	
Body Shaming	1	2	9	
Cultural Diversity	4	27	57	
Lack of Economic Diversity in Volunteers	3	16	28	
Language Barriers	2	3	7	
Ableism and Access	2	3	11	
Rejection of Outsiders	2	6	8	
Self Victimization	3	7	10	

Table 2.5 Codes associated with the thematic category "access and diversity."

In Table 2.5, whereas cases refer to the number of organizations across which a code was applied, sources refer to the number of interviewees associated with that code, and references refer to the total number of times that code was applied across the entire study. Analytically, while the number of cases within which a code or category belongs to is important to understanding how common specific barriers are across organizations and participants, I did not choose to exclude any codes or categories based on count. Rather, codes that came up less often were scrutinized to an even greater degree than more common codes, in order to determine if they provided novel dimensions to a particular thematic category. For a complete listing of codes and categories associated with each research question, please see Appendix C.

Once coding and thematic categorization were complete, I proceeded to choose specific code references, and scenarios described in my field notes, to include in my discussion chapters as illustrative examples of my findings. Alongside, an additional review of the literature, I then proceeded to engage with current theoretical discussions on the themes under investigation.

2.6 Methodological Limitations

I chose to use ethnography and case-study methodologies, because I wanted to help overcome the lack of participant representation that exists within the wider literature on adaptive co-management. Highlighting the lived experiences of community members and land managers, provides the context needed to understand how and why they act the way they do. Additionally, the organizational and institutional cultures involved in this process are unpacked as a researcher mediates the numerous frames of reference provided by participants into a more cohesive understanding of norms and mores. With such a granular focus, the suggestions and best practices I craft in this study, alongside participants, will hopefully be applied positively to the adaptive co-management of parkland in the Metro Vancouver Regional Parks System.

Still, there are drawbacks to my research. First, bias in the form of selective memory, error in remembering the order of past events, and sheer exaggeration on behalf of participants all threaten the veracity of my findings. However, being cognizant of these limitations, I chose to rely on multiple secondary sources of information to help combat these issues that are remarkably common within ethnographic research (Marshall & Rossman, 2016). The use of organizational documentation, follow-ups with participants in the field, and ground truthing all provided additional sources from which I could triangulate my findings and increase their trustworthiness.

Second, due to the case-study approach taken, and the scale of my inquiry, the degree to which my findings can be generalized to other regional park systems is questionable. A lack of consistency in the number of formal interviews and amount of field work I conducted across organizations exacerbates this issue, even though these differences were understandably due to ethics limitations and the number of events hosted by each community group. Additional studies of this type will be needed in the future to cross-check my conclusions, and these will hopefully justify a broader application of the solutions that will be discussed in the following chapters.

Finally, my position as an insider within the communities being studied, resulted in a number of ethical concerns surrounding consent, and to what degree I should report on negative or personal information. Issues of consent were easily remedied by removing myself from the decision-making process surrounding each organization's choice to participate in this research. Further, the process of having the board of each organization vote for their inclusion in this study

ensured that the decision to participate was a democratic one. The issue of reporting negative information about participants or organizations, and to what degree I could report on personal discussions, was much more difficult to navigate in this study. In the end, I chose to anonymize personal information where possible, or to simply not report the specifics of certain matters that may result in harm to my participants. If such matters were central to my analysis, I chose to forgo illustrative examples, or opted for a hypothetical thought experiment to provide context. It can be extremely difficult and time consuming to gain the trust of participants in studies like this one, I chose to preserve and respect those relationships.

2.7 Conclusion

Summarily, in this thesis I conducted a multiple ethnographic case study of four community-based organizations in Vancouver, B.C., and their regional land manager. My goal is to explore barriers to adaptive co-management that these participants are experiencing in relation to citizen monitoring, institutional culture, and stakeholder engagement, while seeking out solutions and best practices to help overcome such obstacles. Specifically, I worked with the Pacific Spirit Park Society, Wreck Beach Preservation Society, Burnaby Lake Park Association, Belcarra Beachkeepers, and Metro Vancouver Regional Parks, conducting thirty-two semi-structured interviews and nearly two-hundred hours of participant observation across forty-five separate events. Additional information was gathered through the analysis of organizational documentation and ground truthing, which aided in the triangulation of my findings. Data analysis involved the iterative, thematic coding of interview audio using Nvivo software, which was then cross-checked with my field notes and additional data sources before I incorporated these findings into my broader theoretical analysis.

Chapter 3: Barriers to Citizen Monitoring

In this chapter I examine how the value and quality of citizen monitoring data has been misunderstood by funders and natural resource managers within Metro Vancouver Regional Parks. This has resulted in the uneven use of citizen monitoring at a regional level, which negatively impacts available data resources for the adaptive co-management of parkland. First, I look at reasons for this disparity in the use of citizen monitoring between West and Central Area Parks. My findings indicate that the perceived value of citizen monitoring data increases as natural resource managers gain experience with this type of data collection. Therefore, unequal levels of experience in the development of citizen science programming by natural resource managers across the region may be one reason for this disparity. Additionally, differences in board demographics impact the degree to which citizen monitoring programs are actively sought out as aspects of co-management, with older boards tending to prefer more traditional programming, like environmental restoration or education. Finally, those seeking to implement new citizen monitoring initiatives are finding that the rigid funding requirements within Metro Vancouver are a barrier to program development. This lack of funding, which generally favors more traditional co-management programming, is largely due to the intangible and illegible nature of the data products that citizen monitoring produces. Further, citizen monitoring data is devalued by funders and natural resource managers over concerns regarding the quality of collected data.

In the second section of this chapter I explore ways in which community groups are working to overcome these barriers. Ground truthing of citizen data collected by members of the Pacific Spirit Park Society's Invasive Species Mapping Program indicates that the use of quality assurance methods by this group has resulted in extremely high rates of accuracy and completeness. However, this focus on quality assurance also reifies traditional notions of expertise, and less democratic, top-down forms of environmental management. I conclude with a call for a more holistic form of data quality assessment by Metro Vancouver that incorporates subjective, value-added, dimensions into our understanding of data quality. By incorporating more utility-based dimensions, such as community development and increased stakeholder

engagement, citizen monitoring can be made more legible to funders and natural resource managers.

3.1 Disparities in the Utilization of Citizen Monitoring

The difference in research cultures between Metro Vancouver's area offices is striking when it comes to co-management, and readily apparent when one looks at the citizen monitoring relationships that exist between natural resource management teams and their corresponding park partners. While citizen monitoring is the most recent co-management activity to be implemented, alongside environmental restoration, education, and advocacy, it is disproportionately centralized within regional parks managed by the West Area Office and within specific partner organizations, like the Pacific Spirit Park Society. Given that Metro Vancouver implements policy and best practices at a regional scale, this sort of disparity undermines the use of citizen science as both a monitoring method and as a form of community outreach. The question is, what fuels this disparity?

3.1.1 Perception vs Experience and the Use of Citizen Science Data

A comparison of perceptions and attitudes between Metro Vancouver staff at West and Central Area Offices sheds some light on this question. While conducting my field work, one staff member from the central area office spoke plainly about why I was not seeing more citizen monitoring programs:

“[The natural resource manager] would be shooting themselves in the foot. It takes too much time, and usually the quality of the data is next to useless...”

Meanwhile, in the process of interviewing a member of the natural resource management team from the West Area Office, they extolled a much different experience with citizen mapping and data collection:

“It takes a lot of work to get mapping done, and there are so few of us [on the natural resource management team] that we could not collect this data without the Pacific Spirit Park Society.... Bottom line is, we need to know what [invasive species] are in the park, how much there is, and to see change over time.”

This difference in remarks over citizen monitoring is not completely unexpected given the state of debate on this topic in the wider natural resource management community. Indeed, my findings mirror those of Burgess et al. (2017) in their survey of biodiversity researchers and the utilization of citizen science data. The degree to which surveyed researchers felt comfortable with citizen monitoring data was highly dependent upon how much personal experience they had with these sorts of data collection programs. Survey respondents who had used citizen science data before had higher levels of trust in non-traditional data sources and were more likely to believe that properly trained citizens could collect high quality data. Meanwhile, those who had not used citizen science data were quick to express a lack of trust regarding data quality; in fact, this was the number one reason that they refused to use citizen monitoring in the first place.

In the case of Metro Vancouver's West Area office, the natural resource manager has experience successfully implementing citizen monitoring through the co-development of these programs with both the Pacific Spirit Park Society and a community group working out of Capilano Regional Park. Additionally, prior to taking on their role at the West Area Office, they spent eight years developing similar programs with another local ecological society. This sort of positive reinforcement through past experience is simply not present within the natural resource management team operating out of Metro Vancouver's Central Area Office. While the Belcarra BeachKeepers' Crab Monitoring Program does operate out of the Central Area Office, it is primarily run through a partnership between their interpretation team and Fisheries and Oceans Canada. Furthermore, the value associated with their data collection efforts is more connected to community outreach and by-law enforcement than the results of any sort of statistical analysis.

Besides the benefit of past experience, Burgess (2017) also found that concerns over a lack of quality in citizen science data could be mediated by a perceived suitability or need for the data. In the case of the natural resource management team member from the West Area Office, there is a clear need for this data. They are stressed in terms of the resources they have available to them to monitor regional parks, and on more than one occasion have explained to me that the task of monitoring regional parks would be "impossible" without the additional labor of citizen science groups. Though I did not discuss if there was pressure to meet any sort of monitoring quota with this participant, they did indicate that the more monitoring data they had available to them, the better. While this participant has expressed a belief in the high quality of citizen

science data, I wonder to what extent need could overshadow the desire for data quality in cases such as this. To what extent might data be deemed “good enough,” and thus be utilized more readily? The literature rarely refer to data quality in such terms, and generally uses broad descriptions, such as “high” or “low” when discussing these matters (Crall et al., 2011; Dickinson & Bonney, 2012; Kosmala et al., 2016). A formalized method of assessment would provide a more complete view of data quality here, and this would meet the needs of citizen science participants in this study who requested a more robust assessment of their work by Metro Vancouver professionals.

3.1.2 Board Demographics and Citizen Monitoring

The unequal utilization of citizen monitoring across the region goes beyond the experiences and perceptions of natural resource managers. For a fuller understanding of why citizen monitoring is being utilized at different rates across Metro Vancouver Regional Parks, one must look to the programming goals of the community organizations involved as well.

As one stewardship technician with Metro Vancouver explained:

“Different park partners have different focusses. I don’t mean to be ageist here, but the Pacific Spirit Park Society is a very forward thinking, youthful board, whereas there are a lot of older boards with more traditional interests like environmental education, and advocacy.”

An executive director with the Burnaby Lake Park Association had a similar point to make, while I was speaking to them outside of their nature house between interviews:

“I’m trying really hard to recruit younger board members, like from Simon Fraser University. I want to start running some of the monitoring programs that [Pacific Spirit Park Society] is, but there isn’t very much excitement on the board about it.”

This idea that youthful boards may be more interested in citizen monitoring was not surprising, particularly given my discussions with those engaged in both the Pacific Spirit Park Society’s Invasive Species Mapping Program and the Belcarra BeachKeepers’ Crab Monitoring Program. Both were run by volunteers who were either high school or undergraduate students. In

addition, their primary reason for taking part in this activity was to gain practical experience in the field to complement those lessons they were learning in the classroom. In 2015, when the Pacific Spirit Park Society co-produced their monitoring program with Metro Vancouver, there was a significant amount of interest being communicated by that society's board. This was because many younger board members within the society had learned about citizen participation in science and were eager to help develop these sorts of programs in their own community. On average, my conversations with older, retired-age, board members within the Burnaby Lake Park Association showed an interest in much more traditional forms of co-management, as the stewardship technician predicted. While this organization does run an impressive bird box program, and data is collected by volunteers on laying species, this is not being readily utilized. Further, members of this program tend to use the bird boxes as part of their educational outreach as opposed to an attempt at systemized data collection.

These findings that demographics may be linked to the utilization or creation of citizen monitoring programs is not new. In the same study by Burgess et al. (2017) that showed past experience could influence the use of citizen monitoring data, they also determined that if professionals were given a choice between data collected by college-age students or retirees, that they showed a strong preference for the former. Primarily, this preference was related to education level, and the fact that students who were learning about conservation biology, or were in similar fields, were more likely than retirees to be knowledgeable about the standards associated with professional data collection. I had similar findings in this study. The university aged students who co-produced the Pacific Spirit Park Society's Invasive Species Mapping Program were not only aware of data collection standards, but a wide variety of quality assurance procedures. I did not witness a similar interest in standards or quality assurance among retired volunteers within the Pacific Spirit Park Society or on other boards participating in this study.

3.1.3 Rigid Funding Requirements and the Creation of Citizen Monitoring Programs

A lack of funding was mentioned by a wide selection of participants as a primary barrier to developing citizen monitoring programs. While Metro Vancouver currently provides an average of \$10,000 in annual funding to park associations within the Park Partnership Initiative, my review of these organizations' financials shows that this money leaves little room to produce

new programs. Of those organizations that were receiving funds from Metro Vancouver, the Pacific Spirit Park Society and the Burnaby Lake Park Association were spending this money on a coordinator to run their current program offerings related to ecological restoration and environmental education. To produce citizen monitoring programs, both societies required additional funding.

Funding above that which is available through the Park Partnership Initiative is limited. Metro Vancouver will pay for volunteer and board insurance, printing, and provide tools for volunteers to support programming capacity; however, there is no liquidity to these supports, and this does little to promote the development of new citizen monitoring programs. In recent years, the Pacific Parklands Foundation, a charity arm of Metro Vancouver, has begun to offer several grants through the George Ross Legacy Fund to provide one time amounts of \$1000 - \$10,000. Unfortunately, this grant has extremely rigid requirements, some of which specifically disqualify citizen monitoring from consideration. Research projects intended for scientific purposes only, ongoing activities and programs, and project supervision or coordination are all listed as ineligible uses for these funds. Ironically, those applying for this grant are asked how they will provide ongoing monitoring surrounding their project, and if not, why this is not being done.

Comparing the Burnaby Lake Park Association and the Pacific Spirit Park Society, there are two primary differences in funding that have resulted in the latter developing several citizen monitoring programs over the past four years:

First, external grants, outside of the Park Partnership Initiative, have been successfully obtained by the Pacific Spirit Park Society, but not by the Burnaby Lake Park Association. Funds acquired from TD Friends of the Environment have provided them with \$10,000 in flexible funding that was used to develop procedures and documentation for stream water quality testing, bog water quality testing, and invasive species mapping. Additionally, they have acquired \$15,000 in funding through B.C. Gaming for their Eco-restoration program, which freed up annual funding from the Metro Vancouver Park Partnership Initiative for use with citizen monitoring. Despite these successes, a grant writing consultant contracted by Metro Vancouver explained to me that these types of flexible grants, specifically those that provide funding for administration or program coordination, are few and far between. They went on to explain that organizations providing grants for the environment want “shovels in the dirt” and “boots on the

ground” to allow for public appearances, cheque hand overs, etc. Citizen monitoring data, and the benefits it provides to land manager are often too intangible for many funders to support.

Apart from successfully applying for external grants, the Pacific Spirit Park Society also received a one-time donation of approximately \$250,000, which was placed in the care of the Pacific Parklands Foundation to ensure that the funds were used for their intended purpose – to promote the ecological health of Pacific Spirit Regional Park. The Pacific Spirit Park Society has drawn on portions of this donation to solve many of their funding issues in relation to the development of citizen monitoring programs. However, while this bequest is now being utilized, the Pacific Spirit Park Society faced similar barriers to the acquisition of these funds that other partners have dealt with when applying for grants. That is, citizen science was not considered an equal dimension of adaptive co-management to funders at Metro Vancouver, and it was difficult to have money released for this purpose. In fact, upon becoming president of the Pacific Spirit Park Society, one of my first duties was to meet with the Executive Director of the Pacific Parklands Foundation to free up these funds so that we could use them to pay for the administration of programs, including citizen science initiatives. During that meeting it was made clear that those sitting on the board of the Pacific Parklands Foundation were largely unaware of citizen science, and they were wary of signing off on funds that were not related to “shovels in the dirt”-style restoration work. In short, they were unclear how citizen monitoring could contribute to the ecological health of parkland. Eventually, I was able to convince them that by funding our monitoring programs, they would be directly impacting our ecological restoration efforts by allowing us to target those locations that were most in need of intervention. When recounting this story with a fellow director for the Pacific Spirit Park Society, they explained why the situation had been so frustrating for them:

“Thank god you and [the program coordinator] were able figure things out with [the Pacific Parklands Foundation]. You would think that with how much Metro Vancouver needs more data on the park, that they’d be more open to funding these programs. It’s like there is some sort of disconnect between funding and management. They really need to get that figured out.”

This inconsistency that the director speaks of is largely due to high levels of departmentalization within Metro Vancouver, which has resulted in a lack of communication between natural resource management teams and funding groups within the organization.

There was no disagreement between research staff at Metro Vancouver that citizen monitoring provides a great deal more data at substantially lower costs. The literature backs up this assertion with numerous examples of citizen monitoring being used due to this cost saving advantage (Aceves-Bueno et al., 2015; Hamilton, Giningele, Aswani, & Ecochard, 2012; Levrel et al., 2010). In fact, Holck (2008) found that, on average, monitoring costs could be as much as two orders of magnitude lower (US\$0.01–\$0.04 vs US\$1.88 ha⁻¹ year⁻¹). Largely unaware of the opinions espoused by research staff, or these examples, the Pacific Parklands Foundation seems to be more concerned about the visibility of the work being done so that their own legitimacy may be bolstered as they seek out potential donors in the community.

Forsten-Astikainen et al. (2017) speak to this common barrier to communication in their research on institutional organizations. “Silo Syndrome,” in which separate departments function in solitude, rather than with other groups across the organization, is damaging as it breeds sub-optimal decision making and insular thinking. In the case of Metro Vancouver, this barrier is preventing the expansion of what could be a win-win for management and funding. That is, if there was more communication between natural resource managers and the Pacific Parklands Foundation, the funding arm of Metro Vancouver may be more aware of not just the research applications of citizen science, but many of the community benefits. They could then highlight these benefits to donors. Instead, rigid funding requirements are being exacerbated by poor organizational communication, resulting in a clear loss for park partners and land managers.

3.2 Overcoming Barriers to Citizen Monitoring

So, how might citizen monitoring be encouraged across Metro Vancouver Regional Parks? What lessons might we learn from successful citizen science programs currently being run in the system? One of the first steps to answering these questions is to address the implicit assumption among some in the Park Partnership Initiative that citizen data is inherently flawed when compared to that of professionals. Without mutual respect, and an understanding of the advantages both volunteers and professionals bring to resource monitoring, co-management will

fail to incorporate local knowledge and values into its understanding of these complex, social-ecological spaces. Unfortunately, such a task is easier said than done, and this culture of expert bias appears to be ubiquitous across citizen science in general (Aceves-Bueno et al., 2015b). Certainly, this is not an issue that the Park Partnership Initiative must grapple with alone.

3.2.1 Overcoming Data Quality Concerns Through Quality Assurance

Those organizations that have a focus on citizen monitoring, and have implemented successful programs alongside Metro Vancouver, showed a focus on overcoming concerns about data quality through an adherence to various quality assurance procedures. In fact, several volunteers were able to point me in the direction of a broad array of quality assurance literature dedicated to countering negative perceptions of citizen science while providing a series of best practices. These volunteers tended to focus on ways to improve objective dimensions of data quality, particularly: accuracy, completeness, freedom from bias, error, and consistency.

In most cases, I found that my study participants were focused on these objective dimensions of data quality and an adherence to quality assurance practices due to a desire to increase their legitimacy in the eyes of Metro Vancouver and the experts within this organization. As the program coordinator for the Pacific Spirit Park Society explained as we took part in their invasive species mapping program:

“We need this data to know what areas of the park we are going to restore, and we need to be able to prove to funders that we are restoring these areas for a reason.... If we don’t have good data, we could lose a lot of respect that we’ve spent a long time cultivating.”

Some of the most common quality assurance measures discussed by interviewees and volunteers in the field were: use of multiple observers (interrater reliability), finding methods of volunteer retention (preserving training within the organization), keeping careful documentation on procedures (maintaining organizational memory), and being cognizant of various sources of environmental, instrumental, and human error. In addition, some program volunteers suggested that data verification may enhance this legitimacy further; however, directors of participating community-based organizations and Metro Vancouver Staff indicated that this would be difficult, because of constraints like time and a lack of human resources.

3.2.2 A Critical Reflection on Quality Assurance and Expert Verification

While this focus on quality assurance is understandable, it can also be problematic as it does little to combat some of the underlying assumptions regarding citizen science data in general.

Within this paradigm the expert is implicitly upheld as the standard by which all volunteers are measured against, and this downplays the valuable contributions that local actors can make to understanding and managing regional parkland (Kosmala et al., 2016; Theobald et al., 2015). Indeed, it was generally accepted among volunteers in this study that high-quality data was determined by the extent to which the accuracy and completeness of their data replicated that collected by an expert. This fails to account for the fact that ecological data collection often relies on subjective interpretation by both volunteers and experts. As Fuccillo et al. (2015) explain, disagreements often occur between experts as well, and this raises questions as to whether such validation is appropriate. If expert verification must be used, it should be considered a form of interrater reliability. Appropriate space for variability of interpretation should be included where subjective interpretation is present, and more than one expert should be used to gauge volunteer data.

However, it is also important to understand the unique position that land managers, or experts, are placed in when citizen monitoring is being utilized. My interview with Rebecca, the West Area Office's natural resource manager, revealed someone who felt a great deal of responsibility for the regional parks they were managing. While they wanted to ensure that community members were involved in the management of parkland, she felt that the final say on management decisions ultimately lay with her. This points to the partial devolution of power and responsibilities that is part of the adaptive co-management framework being used by Metro Vancouver. While limited decision-making capabilities are given to members of the Park Partnership Initiative, Metro Vancouver maintains significant, and final, oversight. Rebecca spoke explicitly to the ethical responsibility she feels:

“As qualified environmental professionals... we are responsible to our college and a code of ethics that says we will treat the environment as our highest priority. We will never do anything that we don't feel is in the best interest of the natural resources of the province.”

For Rebecca, her responsibility to uphold these ethics goes well beyond her relationships with local community groups, or even her employer; rather, she has a duty, inherent to her profession, to ensure that whatever choice is being made is the *right* choice. This sounds familiar to the command-and-control sensibilities of the post-war period highlighted in Chapter 1, and at first felt strange to hear coming from someone who is in support of citizen monitoring, community out-reach, and the incorporation of local knowledge. However, my experience with co-management has taught me that such arrangements are never solid. They are fluid, a delicate interplay between command-and-control sensibilities and power-sharing. While experts may be held in esteem throughout the Metro Vancouver Regional Parks framework, this is not necessarily regressive, because these experts are not only interested in the thoughts of those holding similar education and position. Rather, they promote a flexible approach to management, and a commitment to seek out new ways of understanding the various management problems they face every day. For Rebecca, the right choice often involves a compromise between the complex social and ecological pressures that must both be weighed and measured when making any decision in respect to regional parks.

Still, quality assurance procedures also tend to reify a traditional system of education and training as well. This is problematic when the importance of a co-learning environment is not made clear, and the study does not benefit from a wide range of local, cultural, or other contextually specific knowledges provided by volunteers. In such cases, data gathering protocols and research objectives are often established by the research lead alone to meet various quality assurance objectives. In effect, volunteers become human nodes in a sensor network, tools to be calibrated through education so that the variability amongst data collectors is reduced to maintain acceptable levels of bias. Local knowledge is extinguished (Foody et al., 2017; Lave, 2012).

At the same time though, this view assumes that expertise is one sided in these environments, or only available at the institutional level of co-management. During my time working with these organizations, this could not be further from the truth. The volunteers and directors who make up these park partner organizations are not just local park users – they are full professors at universities, park-planners with thirty years of experience, hydrologists, graduate students, and post docs. In such cases the definition of local knowledge is expanded from traditional knowledge and cultural knowledge, to also include the insights of environmental

professionals that are members of the local community. This is not to say that any one type of local knowledge is more important to the management of regional parks than another; rather, I am simply highlighting the multi-directionality of scientific expertise within these co-management arrangements.

Within the citizen monitoring programs run by both the Pacific Spirit Park Society and the Belcarra BeachKeepers, I found that co-learning and co-production were both extensively used. The Pacific Spirit Park Society's Invasive Species Mapping Program relies on an iterative training regimen, which was continually added to on the basis of volunteer feedback. Participants had already completed three separate meetings by the time I began conducting interviews, during which training materials were assessed by the current volunteers and leaders before being updated. Volunteers indicated that being included in the planning and creation of training materials was particularly beneficial, because they had a chance to address issues that they were specifically having difficulty with. Additionally, volunteer leaders indicated that the creation of these training materials gave them a reason to refresh their knowledge throughout the year.

While quality assurance procedures may unequally portray land managers within these sorts of co-management contexts as sources of verification and legitimacy, they may also downplay local contributions to knowledge production in some cases. These obstacles can also be mitigated. Open and honest commitment to community engagement and co-learning, and an understanding of the social and ecological complexities of regional parks, can help.

3.2.3 Investigating Objective Dimensions of Data Quality in A Co-Produced Citizen Mapping Program

As described in Chapter 2, ground truthing of three hundred and fifty-three records, collected by nineteen citizen scientists taking part in the Pacific Spirit Park Society's Invasive Species Mapping Program, were assessed to determine two common objective dimensions of data quality: accuracy and completeness. My ground truthing was conducted within one month of the initial reporting provided by volunteers, and one hundred and twenty of these records were assessed by a secondary expert of similar education and experience to help verify my own findings. A consistency rate of 98.6% was found between me and the secondary expert.

The purpose of this verification was to provide a baseline understanding of citizen data quality within the Metro Vancouver Regional Parks System. Ground truthing had not been conducted previously due to a lack of time and human resources, and several volunteers suggested this to me as a first step in my investigation of citizen monitoring. My findings show that citizen monitoring of invasive plant species can provide extremely accurate and valuable data to natural resource management teams. Additional ground truthing and quality assurance efforts may therefore be effective in reducing a perceived lack of data quality by partner organizations and Metro Vancouver staff, should the resources be made available to conduct this work.

The Invasive Species Mapping Program was co-produced by the West Area Office Stewardship Technician and the Pacific Spirit Park Society’s Program Coordinator in November 2015. As a brief reminder, this program tracks the distribution of common invasive plant species within Pacific Spirit Regional Park and is run by approximately thirty dedicated volunteers. Since shrubs and sensitive habitat make it difficult to walk or see far from trails, volunteers are asked to collect data on the presence of invasive plants that are within their viewshed from the edges of trails or roads. This viewshed is comprised of the maximum distance that volunteers can see from that edge.

Table 3.1 highlights the accuracy rates of volunteer identification and measurements, as determined through ground truthing.

Variable	Total	EI	EH	LC	HB	CB ¹	CP ²
Identification	98.0	95.6	100.0	93.2	95.8	NA	100.0
Radius & Line Depth	85.0	86.8	86.5	93.2	79.2	NA	68.8
Direction from Trail	100.0	100.0	100.0	100.0	100.0	NA	100.0
Distribution	91.8	88.2	95.3	95.5	79.2	NA	68.8
Proximity to Stream	100.0	100.0	99.5	100.0	100.0	NA	100.0
Canopy Layer	97.7	97.1	99.0	100.0	83.3	NA	100.0
Native Herb Layer %	97.2	98.5	96.4	97.7	100.0	NA	93.8

Table 3.1 Accuracy (%) of volunteer records by invasive species.

¹ No accuracy could be calculated for *Rubus laciniatus* (CB) as only one occurrence was found by volunteers.

² Accuracy values for *Vinca minor* were only based on sixteen volunteer records.

Impressively, volunteers correctly identified invasive species 98.0% of the time. Of the 7 incorrectly identified plants, the most common type of error was a false positive, where no invasive plant was present at the location. *Ilex aquifolium* (English Holly) was identified correctly 100.0% of the time while *Prunus laurocerasus* (Common Laurel) was the least likely to be identified with a rate of 93.2%.

Measurement data corresponding to point radius and line depth were the least accurate of all variables recorded by the volunteers and only 85.0% of records were measured within an acceptable limit of 0.2 meters when compared to the expert's measurements. In general, volunteers were far more likely to overestimate the size of these infestations (83.3% of errors) rather than underestimate (26.7% of errors). Measuring the size of *Rubus discolor* (Himalayan Blackberry) infestations was particularly difficult for volunteers, and these were only found to be correct 79.2% of the time. During a discussion with one volunteer in the field, the reason for a higher rate of error in this variable became clear:

“I think there is a good mixture of eyeballing or guesstimates and then pulling out the measurement. Some are very accurate, and some should be taken with a grain of salt – like within +/- 1.5 meters.”

During my time working alongside these volunteers I became acutely aware of a more practical reason that measurement values might be so low on certain types of infestations – thorns. Simply put, both *Rubus discolor* (Himalayan Blackberry) not only grows in large patches, but has extremely sharp thorns and vines as thick as a person's thumb. To take measurements within the range of error allowed for, additional safety equipment to prevent cuts and scrapes would likely increase accuracy in this area. Until then, “eyeballing it” as the volunteer above explained, is the easiest way to avoid injury.

Direction of infestations from the trail or road edge, and their proximity to nearby streams, were easily determined by volunteers who showed an accuracy rate of 100% when measuring these variables. Volunteers also showed little trouble in determining the canopy layer of infestations (97.7% accuracy) and when estimating native herb layer percentages (97.2% accuracy). Volunteer estimates of infestation distribution was found to have an accuracy of 91.8%; however, when errors did occur in this measurement, they were mostly due to difficulties in differentiating continuous distributions (Figure 2.1, p. 32). This also explains why volunteers

showed the lowest distribution accuracy when estimating the coverage of *Rubus discolor* (Himalayan Blackberry) and *Hedera helix* (English Ivy), which tend to fall into this cover type.

Moving on to levels of completeness attained by volunteers in this study, Table 3.2 shows that this was calculated as 81.8%. A total of seventy seven additional infestations were found while ground truthing, resulting in four hundred and twenty-three expert records compared the three hundred and forty-six correctly identified records found by volunteers.

	Total	EI	EH	LC	HB	CB	CP	SL
Expert Records	423	75	213	53	29	4	21	8
Volunteer Records	346	68	193	44	24	1	16	0
Completeness (%)	81.8	90.7	90.6	83.0	82.7	25.0	76.2	0.0

Table 3.2 Completeness (%) of volunteer records by invasive species.

While overall rates of completeness were quite high, low rates for specific species like *Rubus laciniatus* (Evergreen Blackberry) (25.0%) and *Daphne laureola* (Spurge Laurel) (0.0%) are worrisome. Though uncommon in Pacific Spirit Regional Park, these infestations were found within close proximity to other infestations. During my interview with the lead director for this program, they expressed their frustration with rarer species:

“When people don’t have a lot of hands on experience with rarer species, it is harder to see them when they do show up. We don’t always have the ID book open, and you just forget to look for them.”

While identification documentation is being provided in this case, my discussion with this director brought up the need for refresher training to take place more often to help increase recording rates.

3.2.4 Subjective Dimensions of Data Quality

Citizen monitoring is often characterized as a “win-win” situation, whereby researchers are provided a cheap and efficient source of data, all while public engagement results in higher levels of scientific literacy, education, and other benefits. However, these benefits related to volunteer participation are often seen as fortunate by-products, rather than a goal in and of

themselves (Silvertown, 2009). In this thesis, I join others in labeling these benefits, and other utility-based aspects of citizen monitoring data, as subjective dimensions of data quality (Antelio, Esteves, Schneider, & Souza, 2012; Pipino et al., 2002).

The literature shows a preoccupation towards data gathering objectives, technological advancement, and protocols (Hunter et al., 2013; Roman et al., 2017; Wiggins, 2013). A similar prioritization of objective dimensions of data quality were found in many of the citizen monitoring programs I investigated. However, I also witnessed multiple examples of additional benefits to co-management that, if given the focus they deserve, could increase the utilization of citizen monitoring programs across Metro Vancouver Regional Parks.

Of the citizen monitoring programs that I participated in during this study, the Belcarra BeachKeepers are the clearest example of how these value-added benefits can become primary goals of a program – even surpassing concerns over accuracy or completeness. During my first visit to the wharf at Belcarra Regional Park, I was amazed by the efficiency and professionalism of the high school volunteers who make up the BeachKeeper Program. Of the twelve volunteers who I met in the morning, four split-off from the primary research team to set up a pop-up education stand to teach local community members about beach etiquette and sea-life. Meanwhile the rest of the BeachKeepers continued on to the wharf, filled a small pool with water, and set up buckets so that local crab fishermen could place their catches in them to be measured. In a skillful demonstration of Taylorism, each BeachKeeper had assigned themselves a job for the day to either speak to the public about participating in the study, number and load the crabs into buckets, measure the crabs, or record information for the team. As I began to question the program coordinator, Kara, about what she thought the quality of the data being collected was, she explained:

“There isn’t really an easy way to check that. We don’t usually catch the same crabs twice, so there aren’t many chances to double check our measurements. But they’ve all been trained well, and we always measure twice and record once. Besides, it isn’t really these measurements that [Fisheries and Oceans Canada] are after.”

As Kara was about to explain to me what the primary goal of this research was, our interview was interrupted by a woman who had several crabbing permit forms. She unfortunately did not speak English and was attempting to get her question across to the program coordinator

in Russian. As Kara began to try and answer the woman through a variety of hand signals, one of the BeachKeepers quickly left his position in the line, approached the woman, and began explaining the permitting form to her in Russian. Turning back to me after a few minutes, Kara continued her explanation:

“That’s really the benefit of the BeachKeepers program. They’re educating the public and helping with permitting and by-law enforcement. These kids aren’t just collecting data, they’re building ties with a diverse community down here on the wharf.”

Looking back to the BeachKeepers, I noted that a large number of young children had begun to gather around the pool where crabs were being kept for measurement. One of the BeachKeepers was down on one knee explaining how to tell a female crab from a male crab. A little girl was brave enough to touch one of the crabs, but only for a moment before jumping back and running to her mother who was standing with a group of other parents, learning about the program.

This brief glimpse into my field work shows how incomplete a data quality assessment can be when subjective dimensions are not incorporated into our understanding of citizen monitoring programs. The problem is, that while these added benefits are so clear to those running, or participating, in citizen monitoring programs, they are largely invisible to funders and upper-level decision makers within Metro Vancouver Regional Parks. A number of funders for environmental programming, many of whom list education as a primary requirement, might look twice at the monitoring programs they so often turn their backs on if they were to witness the Belcarra BeachKeepers in action.

Debbie, the community development coordinator for the West Area Office, described the importance of finding a middle ground between subjective and objective dimensions of data quality when I interviewed her:

“Because my work focuses on community engagement and on encouraging community members to be involved in our parks, I see all the sorts of benefits associated with [citizen monitoring]: Social skills, leadership skills, health benefits from being out in the park, scientific literacy, plant identification skills, and a sense of comradery... this is part of what quality data is to me.... But we also need to – there is nothing more disappointing than having work that isn’t used or appreciated. From that perspective it would not be a successful outcome if the data didn’t meet the needs of our resource management team as well. It’s a balancing act.”

Debbie’s focus is not just on the utilization of monitoring data, where many objective dimensions of data quality are of concern, but also on the process of collecting the data itself, where we find subjective, utility-based benefits. From the standpoint of adaptive co-management, the social relationships built through this sort of stewardship work are thought to strengthen the community, while those directly engaged with this work can learn valuable work/life skills. Additionally, adaptive co-management is not just about the act of stakeholder engagement; rather, it is also about empowering and building capacity within communities to help them to grow into informed, critical, thoughtful stakeholders. This can also be a balancing act though, and a compromise is often necessary to determine what is best from both a stakeholder engagement and monitoring standpoint.

However, one problem that emerges from this holistic approach to understanding data quality, is finding a way to classify these many aspects of citizen monitoring. In the development of their qualitoracy index, which blends data quality control and trust/utility metrics to evaluate citizen science initiatives, Antelio et al. (2012) provides one solution to this problem by providing a way to differentiate and categorize various dimensions of data quality. Although their index was created to respond to the needs of crowdsourced citizen monitoring programs, which generally exclude many of the local, community-based components that I have spoken about in this chapter, it can be adapted to meet the needs of co-management frameworks like those seen in the Metro Vancouver Regional District. Table 3.3. shows how this qualitoracy index could be adapted to evaluate the Pacific Spirit Park Society’s Invasive Species Mapping Program.

Quality	Truth	Utility
Accuracy	Reliability	Cost-effectiveness
Completeness	Authority	Stakeholder Engagement
-	Reputation	Scientific Literacy
-	-	Personal Development
-	-	Education
-	-	Health Benefits
-	-	Timeliness

Table 3.3 Categorization of objective and subjective dimensions of data quality.

While this does provide a classification scheme, the term “quality” is a single category, which thematically separates community benefits once more. Although classification is one aspect of data quality, modes of assessment and analysis must be incorporated too. Without these later stages, and an eventual synthesis of these categories to provide some sort of metric, the results will be difficult to utilize when determining how to improve citizen monitoring programs.

3.2.5 Holistic Data Quality Assessment

So, how do we operationalize these subjective and objective dimensions of data quality? Pipino et al. (2002) provide us with a strong foundation from which to begin with their holistic data quality assessment model (Figure 3.1).

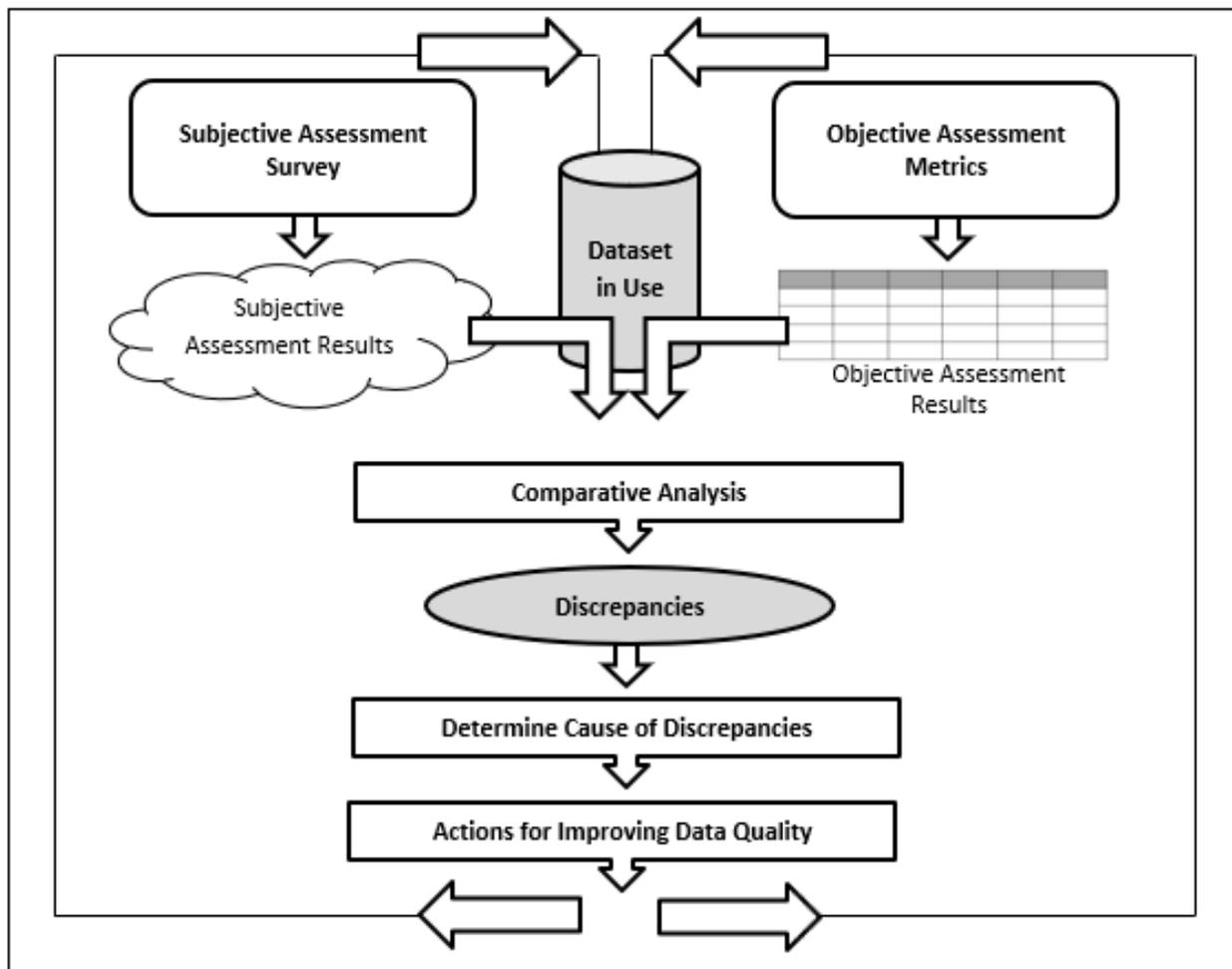


Figure 3.1 Holistic data quality assessment framework. Adapted from Pipino et al. (2002).

Specifically, holistic data quality assessment requires three primary steps: (1) Performing a subjective and objective data quality assessment; (2) Comparing the results of these assessments, and determining what discrepancies exist; and (3) taking necessary actions to refine both subjective and objective dimensions of data quality.

Data quality assessment can take several forms under this framework. Objective assessments may involve ground truthing, as I conducted in this study, or a number of statistical techniques to gauge the data's reliability. Subjective assessments are more difficult, requiring surveys, testing of volunteers, or the utilization of community development metrics. At the same time, there are also dimensions of data quality that cannot be easily tested or analyzed. For example, while we might be able to determine the degree to which volunteers have increased their understanding of certain environmental themes through testing, it would be highly inappropriate to try and gauge how the inclusion of local indigenous knowledge impacted data quality in some sort of quantitative way. In such cases, a grounded assessment would be more appropriate, with a report that provided the needed contextualization to understand the incorporation of these knowledge sources. In these cases, data quality assessment may also need to be co-produced, with local actors directly engaging in the assessment process.

A particularly valuable aspect of this model is that it is continually driving the collectors and users of citizen monitoring data to better this process. While many of the quality assurance procedures discussed earlier on in this chapter may be part of this, subjective dimensions may benefit from the incorporation of different learning styles when training volunteers, structuring tasks so that they align better with local curricula, or even involving specific stakeholder groups alongside one another to strengthen community networks. Finally, this iterative development of data quality is itself going to increase the capacity of volunteers to collect ever more valuable data over time.

Still, to what degree is this form of assessment feasible for those participating in this study? As mentioned earlier, even the prospect of ground-truthing was met with trepidation given the amount of time and labor that is available at both the community and Metro Vancouver level. Realistically, each natural resource management team has two people associated with it: the stewardship technician, and the natural resource manager. Additionally, the stewardship technician is only 80% of a full-time employee. One way this human resource barrier might be

overcome is through increased departmental cooperation and communication. For example, the interpretation teams at Metro Vancouver might assist the natural resource management team in producing more effective learning materials for citizen monitoring groups. Costs could be shared across departments, and deliverables used in both.

3.3 Conclusion

The data resources available to Metro Vancouver could be increased significantly if more citizen monitoring programs were developed and adopted. However, citizen monitoring is being utilized unevenly across Metro Vancouver Regional Parks for three main reasons: (1) Natural resource management team members have different levels of experience in developing this type of programming; (2) demographically, many boards are comprised of retirement-age volunteers who are less likely to develop citizen monitoring programs than university-aged volunteers; and (3) internal funding for citizen monitoring is limited, and external funding is difficult to obtain. One underlying component of these issues is the intangibility, and thus illegibility, of citizen monitoring data by funders, who tend to value more traditional forms of co-management programming. Additionally, there is a widespread tendency to understand citizen monitoring data within a limited, positivist framework that focusses purely on objective notions of data quality, such as accuracy or completeness. A culture of expert bias has resulted in untrue assumptions regarding citizen data quality, namely that it is of lower quality than that collected by experts. Further, community benefits and other subjective dimensions of data quality have been ignored in some cases.

To combat the idea that volunteer data is of lower quality, citizen monitoring groups are using several quality assurance procedures to ensure that their data meets the requirements of Metro Vancouver professionals. My ground truthing of data collected by the Pacific Spirit Park Society's Invasive Species Mapping Program showed an average accuracy rate of 95.7% across all variables being measured by these volunteers. These techniques are working and could be used to bridge issues of expert bias in the future. However, they also reify positivist notions of data quality that exacerbate the issue of expert bias. Instead focus must also be given to more holistic forms of data quality assessment in the future, so that subjective, utility-based dimensions of data quality can be formalized as meaningful components of citizen monitoring.

Currently, these are being relegated to useful by-products, even though they are the primary goal of community groups like the Belcarra BeachKeepers. Unfortunately, human resource limitations remain a significant barrier to both objective and subjective forms of data quality assessment. While citizen monitoring offers a wide array of benefits, these will not be realized in their entirety until this problem is addressed.

Chapter 4: Institutional Barriers to Communication and Technology

In this chapter I explore barriers to adaptive co-management emerging from institutional and bureaucratic structures within Metro Vancouver. Two primary themes emerge from this discussion: (1) Key roles can facilitate or restrict communication to the betterment and detriment of organizations involved in the adaptive co-management of parkland; and (2) centralized, top-down forms of information technology (IT) management do not provide the flexibility needed to meet the iterative, exploratory nature of adaptive co-management.

I begin by looking at the role of community development coordinators and investigate how they operate as both gatekeepers and facilitators when it comes to communication between partner organizations and Metro Vancouver officials. Specifically, I discuss how communication policies are being applied unevenly across the region by these coordinators and connect this to differences between West and Central Area Offices in terms of unequal organizational growth, human resource capacity, and interpersonal conflict.

Second, I investigate how rigid policies surrounding the implementation of new technology at Metro Vancouver are impacting their ability to engage with community partners. As innovative technologies are left unapplied, community partners and Metro Vancouver lose out on increased efficiency and productivity associated with citizen monitoring and volunteer engagement. The underlying bureaucratic culture at Metro Vancouver is central to this barrier and a culture-shift is greatly needed to promote increased flexibility and collaboration.

4.1 Community Development Coordinators: Gatekeepers and Facilitators of Communication

Each of the area offices within Metro Vancouver Regional Parks has a community development coordinator associated with it. These coordinators have an important role to play by supporting park partners and associations in their region. They are responsible for keeping these organizations informed of changes at Metro Vancouver, facilitating communication between staff and volunteers, working with boards to build programming capacity, and ensuring continuity. While this position may seem straightforward on the surface, my time working with both the West Area and Central Area Offices has taught me that there is room for a great deal of

interpretation regarding how these duties are to be performed. To illustrate this point, below are excerpts from my interviews with community development coordinators from both offices:

“As a community development coordinator my key role is providing coaching for park partners.... We can’t just ask a park association to form and learn to function as a society when its run by volunteers with different levels of experience with non-profits and governance. I don’t provide a crutch, or constant hand holding, but I do provide governance support so that each new board doesn’t have to spend a year learning how to run a society.... Much less in my role, and I can’t speak for other [community development coordinators], because we’re all different. I do not function as a Metro Vancouver liaison very often, sometimes I do, but usually I am there to see if they have any questions and then I can just direct them on to the proper staff person if needed.... I think of my relationship with park partners as a collaborative one.”

-Kara, Central Area Office

“As [a] community development coordinator with Metro Vancouver Regional Parks, my role is to engage with partner groups who are doing volunteer work in the west area. I help the partner groups to complete the projects they are working on in the parks, and I also make sure the park partners are working within the guidelines set out by Metro Vancouver.... Part of my job is also to provide regular updates to park associations. I provide reports on a monthly basis to park associations so that they are aware of various operations going on in the park.... I’m also the point of contact for directors and volunteers from partner organizations. If someone wants to contact a staff member then they go through me, and I forward on their request to the appropriate person.”

-Debbie, West Area Office

Kara and Debbie, while technically providing similar services, vary considerably in where their focus lies as a community development coordinator. Kara views her role as much more of a coach. In line with the original goals of the Park Partnership Initiative, she sees park associations and park partners as mostly autonomous in their operations and believes that she is there to share information as requested. Conversely, Debbie operates as more of an informer of Metro Vancouver policy. While she does provide excellent coaching services, and sound advice on governance, she is also quick to inform boards about whether or not their suggestions, or projects, are in-line with Metro Vancouver’s current messaging. Similarly, when it comes to communication, Debbie is much more structured in the way she approaches facilitating contact between Metro Vancouver staff and volunteers. In fact, all communication with staff, except where that communication is expected or ongoing, must go through Debbie. Additionally, park

partners are made aware of Metro Vancouver updates monthly, through a formalized report. Meanwhile, Kara takes a much softer approach. Volunteers are expected to contact Metro Vancouver Staff directly where needed. If they are unsure of who to contact, Kara provides them with this information, and makes introductions. Similarly, she only provides updates from Metro Vancouver when requested by volunteers or staff, and is more fluid about how and when this occurs.

The degree to which partner organizations interpreted structured approaches to communication as a barrier was heavily reliant on their familiarity with staff. Several participants explained that they preferred more structured communication with Metro Vancouver when they were new, or when they had not previously worked with a particular staff member before. In these cases, the community development coordinator was seen as a facilitator of communication. However, when someone was already familiar with the particular staff member, this role of facilitator was quickly reinterpreted as that of a gatekeeper: someone who slows the flow of communication with staff through the application of procedures meant to vet a person's right to engage in conversation. Susan, a member of the Wreck Beach Preservation Society, voiced her frustration with recent changes to West Area Office communication procedures:

“It’s absolutely garbage that I have to go through [Debbie] when I need to speak to [the park managers] or [the natural resource manager]. Things never use to work like this, and I don’t see why I have to change who I’m contacting when I’ve been doing this for 40+ years now!”

In addition, Mellissa, had a more specific concern about the sort of indirect communication involved when dealing with gatekeepers:

“Technical details get lost in the mix when we have to go through a middle-man. We need to be able to speak to management staff directly, and if we can’t do that all the time, then they should come to our board meetings... at least quarterly, to answer questions.”

As Folke et al. (2005) express in their discussion of the adaptive co-management of social-ecological systems, one common aspect of institutionalized governance is controlling the ways in which actors contest decisions and access resources. Thus, the sort of structured communication policies found at the West Area Office are somewhat expected within a

bureaucratic organization like Metro Vancouver. However, roles like the community development coordinator may undermine many of the benefits associated with adaptive co-management, particularly enhanced stakeholder engagement, if they limit the ability of parties to exploit the collaborative capacity of interorganizational networks. In fact, successful examples of adaptive co-management often see the emergence of more informal, rather than structured, communication networks, which help to “facilitate information flows, identify knowledge gaps, and create nodes of expertise... that can be drawn upon at critical times” (Folke et al., 2005, p. 459). The informal nature of these social networks is important, because this allows actors to communicate without worrying about scrutiny or the obligations of their particular organizations. Political independence through the use of these communication networks frees up individuals to develop alternative strategies, learn from one another, and think creatively (Folk et al., 2005; Gunderson et al. 1995).

The flexibility in Kara’s approach to communication is very helpful in forming these informal networks. In my experience, flexibility allows these networks to develop spontaneously alongside the co-production of multiple programs or projects. With that co-production comes a familiarity with those one is working with, trust, and an understanding of the sorts of constraints different teams are dealing with across organizations. As working relationships are strengthened over time, procedural constraints are often put aside, further increasing flexibility and the efficiency of these teams.

Still, this is not to say that these informal networks cannot exist within less flexible environments, in fact, they often have to. Even though Kara’s flexible approach to communication across organizations is beneficial, she is still aware that Metro Vancouver’s approach to co-management is not traditional in form:

“The idea behind the Park Partnership Initiative is to have independent societies kept at arm’s length, but still in participation with us. The difference between our system and more traditional community development, is that traditionally there is a lot more power sharing, more devolution. But, as a government organization we cannot do that to the same degree, so our co-management is based more on collaborative programming and events.”

Metro Vancouver feels strongly that it must maintain final oversight when it comes to management decisions, and this necessarily leads to hierarchical communication and decision-making structures that are common within more centralized forms of natural resource management. Informal networks, or additional pathways through which community groups and volunteers might impact policy and management decisions, are integral to the survival of co-management in these types of scenarios.

While more structured communication procedures can provide barriers to those engaging in the adaptive co-management of parkland, why is there such a difference between West and Central Area Offices? While there is a difference in how community development coordinators approach their job, that is not all there is to this situation. My time attending board meeting with the Pacific Spirit Park Society, and the Wreck Beach Preservation Society, showed that the West Area Office has had to implement restrictive communication policies to overcome other obstacles to co-management. Specifically, unequal organizational growth between partners and Metro Vancouver, coupled with limited human resources, has forced these policies into effect so that Metro Vancouver can slow the pace co-management to a level that it can engage with. Additionally, interpersonal conflicts between the Wreck Beach Preservation Society and Metro Vancouver Staff has resulted in a need for structured communication procedures to reduce conflict and hopefully place the focus on building healthy relationships that strengthen collaboration and co-management. These additional barriers to the rise of rigid communication policies will be explored in the next two sections.

4.1.1 Unequal Organizational Growth and Human Resource Capacity

When I first joined the Pacific Spirit Park Society in 2015 at the request of a fellow classmate, I explained to the community development coordinator how excited I was to begin working with Metro Vancouver on a number of new program offerings. Together, my fellow classmate and I had spent the previous summer conducting a citizen-lead biodiversity survey of a local park, and we had high hopes for introducing citizen science into the relationship between Metro Vancouver and the Pacific Spirit Park Society. Within the next six months, I had joined the society as an executive director, and my classmate had been hired on as the program coordinator. By the following year we had consolidated the society's ecological restoration work,

which had previously focused on the removal of a single invasive species per program, into the EcoTeam. This invasive species removal program took a more holistic approach to infestation management, targeting the same seven species on every outing. Volunteers would also plant native trees, shrubs, and herbs in restoration areas for half the year. Additionally, we co-produced the Invasive Species Mapping Team with the West Area Office’s natural resource manager, and began recording the presence of these same invasive species throughout the park, so that we could continue to improve our restoration efficiency. In November 2017, I became president of the society, and with the influx of many new board members, expanded our citizen monitoring programs to include stream water, bog water, and the impact of our restoration efforts. We also created two new environmental education programs, targeting small children and the elderly, and formed an advocacy group to fight against UBC’s continued destruction of a greenway corridor that connected disparate parts of the park. This past January, in 2019, we developed our newest citizen monitoring program, focused on mapping the location of active eagle nests throughout the park.

As a brief summary, Table 4.1 shows the program offerings available in the summer of 2015, compared to the Spring of 2019. It highlights the incredible amount of program development that occurred within a brief amount of time. How might extreme growth within a partner organization impact the ability of a land management agency to utilize additional monitoring and restoration resources?

Summer 2015	Spring 2019
Ivy League	EcoTeam
Holly Haulers	George Ross Restoration Project
Camosun Bog Restoration Group	Camosun Bog Restoration Group
	Invasive Species Mapping Program
	Stream Water Quality Monitoring Program
	Bog Water Quality Monitoring Program
	Eagle Monitoring Program
	EcoWalks
	EcoKits
	Ecorestoration Monitoring Program
	UBC Development Working Group

Table 4.1 Pacific Spirit Park Society program offerings: 2015 and 2019

In a review of meeting minutes from Spring of 2016, the community development coordinator for the West Area Office explained to the program coordinator and myself that she was extremely excited about our rate of growth over such a small period of time, but that we had to find a way to address how much staff time was being utilized. She politely explained that the Metro Vancouver had multiple parks to manage, and that Pacific Spirit Regional Park was only one of those. At the next board meeting, the Pacific Spirit Park Society agreed to a more structured communications policy, whereby contact with Metro Vancouver Staff would go through the community development coordinator. This would allow the community development coordinator to reach out to all impacted staff within Metro Vancouver, so that available resources could be considered before agreeing to additional projects that had not been approved during joint work planning. Joint work planning, during which Metro Vancouver pledges staff time to assist in the co-production and management of various partner programs, would also be redesigned that year. In effect, programs and projects that were not discussed during joint work planning, would be unlikely to receive staff support as a way to ensure human resources were not being used in an unsustainable manner.

Human resource limitations are a common theme within the literature on adaptive co-management; however, this barrier is usually discussed in regard to the need for additional labor to assist in data collection. Meanwhile, a significant gap exists in the literature regarding the effect that limited human resources can have when community partners begin to show extreme rates of growth that land managers are unable to match. While organizations like the Pacific Spirit Park Society are only limited in terms of funding, time, and the willingness of their volunteers to participate, Metro Vancouver does not have such flexibility.

As discussed in Chapter 1, organizations engaging in adaptive co-management that are slow to adapt to new lessons or management pressures, due to bureaucracy, institutional rigidity, or even individual attitudes, often experience management failures (Berkes et al., 2007; Méndez et al., 2012; Williams, 2011). Williams (2011) also notes in her discussion of learning-based institutions, that these organizations can be handicapped by the belief that adaptive co-management will not require significant departures from the norm and involve only occasional changes in management actions. Little attention is given to institutional barriers or redesigning organizational structures to accommodate emerging needs. In the case of the West Area Office,

they were not able to accommodate unequal organizational growth in a partner organization. Rather than overextend their resources and risk failure, they implemented structured communication policies to slow, or in some cases prevent, workflows emerging from the Pacific Spirit Park Society. While partner organizations may impact human resource pools for land managers in positive ways (e.g. restoration labor, monitors, etc.) they may also increase stress on pre-existing labor pools where chokepoints exist.

4.1.2 Interpersonal Conflict and Structured Communication Policies

“Over my naked, dead body!” This is Susan’s war cry when she disagrees with a management decision, and I have heard it uttered many times in the four years I have been involved with Metro Vancouver Regional Parks. She is an executive director on the Wreck Beach Preservation Society and considered by many to be a fixture of the clothing-optional beach that she has defended since 1967. Never a wallflower, she arrived for her interview with me in one of her favorite jean jackets, adorned with buttons and patches from the many environmental organizations that she has pledged her time to over the years. Her purple and pink hair has always reminded me of the tie-died shirts of a 1960s protestor, and on the occasion of our meeting she had included some blue highlights as well.

Before I could begin my questions, she began to explain to me how she is tired of being excluded from decision making, which she links to a conflict she has with the West Area Office’s park operations manager:

“I set up a meeting [with the University of British Columbia], I wanted to go in and learn why it was that they had already designed a \$400,000 berm over a surf-smelt spawning grounds without letting [the Wreck Beach Preservation Society] know. Well, [the Park Operations Manager, Peter,] knew, he came to our meetings on a monthly basis after all, and never said a damn word about this. So, he shows up, and I lit into the guy who designed the berm during the meeting, and then I turned to [Peter] and said ‘yet you never said a word about any of this!’. Later, he said that he wouldn’t be at anymore of the meetings, and that he was furious with me. So, he hasn’t come to any of the meetings since. I’ve asked him several times... but he just doesn’t come.”

Bringing up this scene with Peter during my interview with him a few months later, he disagreed that there was any sort of personal disagreement and blamed his lack of attendance at

meetings with Susan on scheduling. A mirror opposite of Susan in a crisp shirt and tie, he pressed a smile as he said this, and explained that he would be happy to attend a meeting if the Wreck Beach Preservation Society had anything they would like to discuss:

“You can tell [Susan] to just contact [the community development coordinator] and we can schedule a meeting.”

I recount all of this in such detail, because I wish to foreground the personalities and organizational cultures that are involved. While interpersonal conflict is going to exist in any co-management arrangement, I have found that this common social barrier has been exacerbated by very different styles of engagement in this case. Susan, and many of the Wreck Beach Preservation Society members that I spoke with, display a watchdog-type mentality when working with Metro Vancouver. That is, rather than co-produce programs or projects, they are more focused on evaluating management practices and ensuring that the best-interests of Wreck Beach are at the center of any decisions made by staff. An activism-style of environmentalism is used, and combative/accusatorial language is often the norm.

Meanwhile, Peter and Metro Vancouver have a board-room style approach to engagement, expecting all parties to cordially engage in discussions, with compromise between stakeholders and Metro Vancouver being an important aspect of collaboration. In their minds, the Wreck Beach Preservation Society has been designated as a stakeholder and should therefore be content in coming to the table to collaborate in an amiable fashion. When discussion is less than amiable, offence can be taken, resulting in a desire to engage with the Wreck Beach Preservation Society less often.

Linking this back to the use of more structured communication procedures at the West Area Office, Metro Vancouver is filtering a more combative style of environmentalism through the community development coordinator. In effect, they are trying to foster a more collaborative approach on behalf of staff by preventing animosity from reaching them. Regardless of intent though, my discussions with staff indicate that they have been spared few unpleasanties by this process.

Troubling this, to what degree is this sort of filtering of communication an obstacle to adaptive co-management itself? In so far as one half of the adaptive co-management framework

is connected to stakeholder engagement, this policing of an organization's voice (either through filtering or a resistance to working with certain members) seems antithetical to the goals of the Park Partnership Initiative. Speaking with those at the Wreck Beach Preservation Society, their primary issue with Metro Vancouver is a lack of information sharing. Further, when information is shared about management decisions it is sometimes done so after those decisions are implemented. Pacific Spirit Park Society has made similar complaints regarding information sharing, claiming that Metro Vancouver has withheld information that is important to making an informed decision. When I sought a response to this, the community development coordinator was clear in their reasoning: some information is politically sensitive and could upset current negotiations with other stakeholders, such as indigenous groups.

A more flexible, and open approach to communication, that appreciates the power imbalances that are often present within co-management, seems to be needed in this situation. Takeda and Ropke's (2010) work in facilitating collaborative ecosystem-based management is of interest in this regard. In their study, working with the Haida Nation, they incorporated communicative planning theory into their theoretical framework, and paired this with a Habermasian understanding of communicative rationality. Habermas (1987) defines communicative rationality as "a noncoercive unifying, consensus-building force of a discourse in which participants overcome their at first subjectively biased views in favor of rationally motivated agreement" (p. 315). In essence, this moral and political philosopher believed that the purpose of all communication was to find shared agreement, and from this premise, developed several rules to assist in free and open dialogue that would assist in this goal. Meanwhile, communicative planning theory builds on this understanding to create power-neutral forums by disallowing restricted argumentation, stakeholder exclusion, and the obfuscation of information (Takeda & Røpke, 2010). In other words, all relevant parties should be included in discussions, and everyone should be equally informed. Takeda and Ropke (2010) found that the inclusion of these principles were useful in the development of power-neutral forums; however, they also noted that broader institutional and political structures remained embedded, meaning that the neutrality they sought was limited by systemic issues, such as: racism, homophobia, etc. Still, a purposeful and transparent application of these principles might result in better communication

overall, or at least place a spotlight on existing problems. In Chapter 6, I will explore how more open communication policies, like these, might be operationalized.

4.2 Bureaucracy and the Slow Adoption of New Technology

“For me to use certain software, it has to be approved through IT, and it is a very long-winded process for them to get back to me. I’m not even supposed to use google drive. I can’t use Access, and it would be very nice to have a database for the invasive species mapping program... instead we have to use Excel, which is very limited. We can’t use iPads... but for some reason we can use iPhones.... As stewardship techs, we even just got access to Facebook, and only because partnership groups are using it. So that’s a barrier, because we can’t connect with our partners. [Metro Vancouver] wants to make sure we’re using it for work, you know... not watching cat videos or something. And even though we’re able to use it now to look at partner pages, we can’t even post anything, as anything we say would have to go through our public relations people.”

-Tom, West Area Office

When Tom provided me the above quote during our interview at the West Area Office, he seemed almost embarrassed. Part of this embarrassment, I think, came from the fact that the technologies being discussed were so rudimentary to standard business - they were not even specific to natural resource management itself. Indeed, the idea of a governmental organization, as large as Metro Vancouver, not having a policy for their workers to engage on Facebook is verging on the absurd in 2019. Additionally, Microsoft Access, a relational database program that was originally released in 1992, is a standard accompaniment to the Microsoft Office Suite currently being used by Metro Vancouver. It is one of the most accessible database products currently in existence and is regularly installed on home computers. While some software might require training, or be prohibitively expensive, neither Facebook or Microsoft Access fit either of these descriptions. In fact, the IT department assigned to Metro Vancouver Regional Parks would have to spend resources in order to prevent their employees from using these technologies. Most staff members I spoke to at Metro Vancouver, both via formal interview and in the field, explained that these programs would help their job performance.

The co-management relationship between Metro Vancouver and its partner organizations is strongly mediated by technology. In terms of programming, partners involved in citizen science and monitoring are constantly looking for new technologies to assist in the collection and dissemination of their data. In addition, Metro Vancouver must analyze, visualize, and report on

the information provided by partner organizations, which requires an entire suite of geographic information systems (GIS) and programs. Finally, in regard to volunteer recruitment and retainment, websites, social media, and other applications to assist in communication and outreach are constantly being used. Unfortunately, Metro Vancouver has consistently proven throughout my research that it is behind the times when it comes a large number of critical technologies. Metro Vancouver has indicated that this is primarily due to red tape, set in place by the information technologists assigned to Metro Vancouver Regional Parks, and the economic realities of trying to deploy such technologies across a large region. However, even in those cases where time and economic investment is limited, I have found that this barrier is no weaker – this leads me to believe that this issue is more institutional in nature.

In this section I will first look at how the slow adoption of technology is impacting innovation and volunteer engagement within partner organizations. Following this, I will highlight those institutional aspects of Metro Vancouver that seem to be exacerbating this issue. Finally, I will explore the prospect of undergoing a culture shift at Metro Vancouver, and what project management might look like under an Agile governance model.

4.2.1 A Barrier to Citizen Monitoring and Volunteer Engagement

The fact that citizen monitoring is one of the most recent additions to programming across Metro Vancouver Regional Parks is not surprising. Until 2005, when smartphone technology took the world by storm alongside recent advancements in the democratization of global positioning systems (GPS), citizen science was not utilized to the same degree as it is today (Foody et al., 2017; Newman et al., 2012). However, with the combination of these two technologies, this field has grown rapidly (Kosmala, 2016). Simply put, the innovative use of new technologies has been driving successful citizen science projects since the mid-2000s.

Rose, a director and volunteer from the Pacific Spirit Park Society, had the following to say when I asked her about how recent changes to technology had impacted their invasive species mapping program:

“We were using pen and waterproof paper to record the invasives we were finding, but it took a lot of time to re-type everything onto a spreadsheet for Metro Vancouver. Having to retype everything also meant we had more chances to make a mistake too... some people’s writing is just unreadable. I was really happy when we started using the tablets to collect data, because there is no re-typing and the drop-down menus mean that there is little room for error.”

The shift from paper to electronic data collection is certainly a big step and can have a significant impact on data accuracy (Foody et al, 2017). Still, while this is a positive move forward, it is also an indication of how far behind in the use of technology the Pacific Spirit Park Society is. Today, the use of a smartphone or tablet to collect data is generally expected and would certainly not be considered an innovative use of technology. While the Pacific Spirit Park Society has considered more modern upgrades to its program through the use of a server for data storage, and the use of interactive web maps to help increase the public dissemination of their data, they have been unable to acquire funding for these projects. Meanwhile, Metro Vancouver has indicated that this is not within their current budget, and outside the purview of those funds they have set aside for additional capacity funding for partner organizations.

Responding to these claims that there is a lack of technological innovation, and that this is negatively impacting citizen monitoring, the Stewardship Technician with the West Area Office explained why Metro Vancouver is so hesitant to invest in new technologies:

“We’re taxpayer funded, we need to be selective in how we’re spending that money, and what technologies we’re investing in. The red-tape is there because we could jump in and use an app, and invest in that app, but then in a year we might not be using it anymore. All of that money we spent would be wasted, and we’d be forced to continue using an outdated technology. A great example would be if we had invested in using Myspace. We’d be saying ‘Hey, check out our Myspace page!’ Well everyone would look at us and be like... “What is a Myspace page? Use Facebook!”

Either this explanation, or some variant of it, was provided to me by several staff at Metro Vancouver when I asked them about the organization’s hesitation to embrace new technologies in citizen monitoring. This region-wide thinking effectively prohibits innovation, as it attempts to universalize any attempt to use new technologies. Meanwhile, from the viewpoint of adaptive co-management practitioners, who often require the adoption of new technologies to

meet the needs emerging from management experiments, this is highly problematic. A more localized, rather than centralized, IT infrastructure is what is needed in this circumstance.

Regarding volunteer engagement, as programming has grown across the region, recruitment has consistently grown in importance for the partner organizations that I worked with in this study. Interviews across the Pacific Spirit Park Society, the Wreck Beach Preservation Society, and the Burnaby Lake Park Association all indicated that current methods of volunteer engagement were inadequate, and that changes had to be made if they were going to ensure a healthy volunteer base across their multiple program offerings.

Kris, the Pacific Spirit Park Society program coordinator, explained how Metro Vancouver's unwillingness to embrace new technologies is impacting her ability to coordinate events and recruit volunteers:

“We use several different platforms to recruit volunteers, but Metro Vancouver only uses Meet Up. Meet Up doesn't work well for us, because it doesn't give us much control over limiting volunteer numbers, or making event changes on the fly.... We would prefer to use Facebook and other options, but when we're co-running an event with Metro Vancouver, we're forced to work with the sites they're allowed to use.”

Speaking with Metro Vancouver staff, they indicated that they had been successfully using Meet Up for many years, and that they were hesitant to change, because they viewed these issues being reported by partner organizations as relatively minor compared to the time-cost of setting up and monitoring accounts across numerous websites or recruitment mediums that they may not even be allowed access to. In other words: if it isn't broke, why fix it?

4.2.2 Institutional Culture, the Management of Shadow Information Technology, and Stifling Innovation

Connecting the experiences of volunteers and staff has revealed how problematic rigid IT policies are on partners seeking to engage in data collection and volunteer outreach. As these partner organizations continue to grow, and their technology demands follow suit, this barrier is likely to worsen. While the reasoning given by Metro Vancouver for this lack of technological adaptation points to more practical concerns like budgetary shortfalls and time constraints, my

findings indicate that additional funding and the hiring of additional staff will have little effect without also implementing changes to their IT management framework and institutional culture.

Until recently, Metro Vancouver has maintained a relatively stable co-management relationship with park associations and park partners that has revolved around collaboration on more traditional ecological programming, such as: environmental restoration, education, and advocacy. However, in recent years, as citizen monitoring has been introduced, and partner organizations have grown to the point where new technologies are required for volunteer engagement, this co-management relationship has been strained by Metro Vancouver's inability to quickly adapt to these emerging needs.

Departmentally, Metro Vancouver has a hierarchical, top-down decision-making structure regarding internal policies that is punctuated by a passive participation process that does not engage those lower in departmental ladders. Due to this, the internal policies at Metro Vancouver, as I showed with funding in Chapter 3, do not always coincide with the needs of those teams who are actively engaging in co-management activities. As I have indicated in this chapter, this is also true of technology. From the perspective of partner organizations, this can be extremely frustrating: Technologies that they want have the backing of staff that they are engaging with, but in reality, requests are likely to be denied by senior officials operating out of Metro Vancouver's IT department. Departments are internally focused, and power-distance relationships, in which those lacking power accept the unequal distribution of that power, have been promoted at the institutional level. This has resulted in rigid IT policies that require long, and arduous processes to seek out accommodations for the use of new technologies.

Metro Vancouver's bureaucratic, centralized IT management framework, combined with recent issues regarding a lack of innovation, is indicative of an organization that is concerned with the proliferation of shadow IT, or "autonomously implemented information technologies outside of the purview of its IT department" (Zimmermann, Rentrop, & Felden, 2017, p. 79). In an organization as large as Metro Vancouver, this concern is not unwarranted either – nearly two thirds of IT managers acknowledge the existence of these sorts of technologies within their organizations (Zimmermann et al., 2017). Proliferation of shadow IT can carry severe control problems for IT professionals, and is often of importance to risk managers, auditors, and high-

level administrators (Boritz, Hayes, & Lim, 2013; Zimmermann et al., 2017). One participant with over twenty years of experience in information technology explained to me:

“Imagine if a member in one department created a piece of technology as a workaround. Then, let’s say that this employee provided this workaround to a friend in another department. What if this technology is eventually distributed to half of all departments, because it is so useful? Now, imagine if that initial employee leaves the organization, and those who were obtaining technical assistance from them through informal networks suddenly had to rely on central IT professionals who likely do not even know that the technology in question exists. Complicating matters, that technology has probably been adapted to each new department via a number of undocumented workarounds as well... it’s chaos”

Within an adaptive co-management environment, where continuous management experiments require on-the-fly solutions to a range of ecological, organizational, and administrative issues, the proliferation of shadow IT is likely. Certainly, the rigid policies emerging from Metro Vancouver’s IT Department indicate this is a concern. Unfortunately, while such policies may be reducing overall risk from an organizational perspective, they are also stifling innovation and presenting substantial barriers to partner organizations and natural resource management teams as discussed in the previous section. How might we overcome these obstacles, in a way that meets the needs of all actors involved?

4.2.3 A Case for Agile Project Governance

In solving issues that are so connected to organizational culture, a shift in the project governance approach being used is required. Indeed, the bureaucratic culture and rigid policies being implemented by Metro Vancouver are incompatible with its goals related to adaptive co-management and must be changed. Currently, policies stifle innovation, block the utilization of new technologies, and promote stultified communication with partner groups and other departments. Meanwhile, adaptive co-management thrives in a system that is highly flexible, promotes institutional learning, and can respond to emerging needs (Allen & Garmestani, 2015).

Recent turns in institutional governance have highlighted Agile governance as a way to move beyond many of the barriers associated with traditional forms of organizational management. Emerging from the field of software engineering, Agile governance involves a

project-oriented approach to management, in which change and uncertainty are embraced through the iterative development of organizational goals and their associated deliverables, which are actualized through informal networks of collaboration (Dybå & Dingsøy, 2008; Lappi, Karvonen, Lwakatare, Aaltonen, & Kuvaja, 2018). Similar to adaptive management, these collaborative efforts can be seen as experiments, which the organization uses to decrease uncertainty by improving its methods and procedures. Today, Agile governance is spreading to many fields outside of information technology, including: nursing, law, and water management (Hassett & Burke, 2017; Sousa, 2013; Sukop & Lanier, 2016).

At the core of any agile approach, are four primary values. Though traditionally written for information technologists, I have adapted them from Beck et al. (2001) to meet the needs of a broader audience.

First, is the idea that individuals and their interactions are more important than processes and tools. That is, people are the ones who respond to emerging needs and drive the development of deliverables. Tools and processes tend to be rigid, and less responsive to change overall.

Second, working deliverables are more important than comprehensive documentation. Under traditional governance structures, projects must go through a wide array of sign-offs, resulting in a bureaucratic paper trail of reports, emails, and approvals. Rather than eliminating documentation entirely, Agile procedures streamline this to focus on documentation that records the needs of end users, partners, and creators. While permitting is sometimes needed, these sorts of bureaucratic structures are curtailed or lessened where possible.

Third, collaboration is paramount. Working together with end-users or partners as team members ensures that their needs are met, and teams also benefit from the wide range of contextualized knowledge that these individuals hold. Collaboration also means that a transparent relationship with the organization's IT department is maintained to ensure that deliverables work with other systems and procedures.

Finally, responding to change is preferable to just following a plan. Due to the iterative nature of Agile governance, priorities can be shifted from one iteration to another. When one is determined to simply follow a plan, they become unable to meet emergent needs. Flexibility is therefore highly valued under this model.

Connecting this project governance model back to overcoming the slow adoption of new technologies at Metro Vancouver, this approach aligns much more closely with the intention of the Park Partnership Initiative. Using an Agile approach, the restrictive technology policies that are currently being utilized would be removed, and instances where new technologies are requested would be reinterpreted as a management experiment to learn from. The collaborative approach undertaken by Agile practitioners would similarly benefit from the culture of co-production that already exists between partner organizations and natural resource management teams. Additionally, more transparent collaboration with Metro Vancouver's IT Department would lessen worries over the proliferation of shadow IT, as the autonomous production of new technologies outside of the IT group would be both expected and tracked. The end result of this governance shift would be increased flexibility, a culture of innovation, and a strengthening of relationships between Metro Vancouver and the community groups it is seeking to work with.

While the application of Agile governance may seem like a panacea in this instance, it is also important to understand that it can suffer from unintended issues as well. Specifically, Agile governance requires a delicate balance between flexibility and structure. While many of the barriers discussed in this chapter have been due to over-structuring, a lack of structure can lead to problems in maintaining long-term goals, and chaotic development phases when it comes to projects and programming. In addition, while internal governance and culture can be changed over time, one must not be negligible when it comes to the compliance requirements of external organizations, particularly those with oversight. Due to this last point, as well as kick back from key persons or departments, it is often the case that resulting governance models exist as a mixture of both Agile and traditional methods (Lappi et al., 2018). In these cases, a project by project application may be more appropriate. In the case of Metro Vancouver, due to the age of the organization and its institutional entrenchments, this would probably be the most likely scenario if the organization decided to embrace a more open and flexible culture via Agile methods.

4.3 Conclusion

Institutional barriers to communication and the adoption of technology have strained the co-management relationships between Metro Vancouver and their community partners. This has

impacted the ability of these partner organizations to provide input as local stakeholders and stunted the development of citizen monitoring programs. Interview participants and program volunteers who I spoke with pinpointed a number of practical barriers: overly structured communication policies, interpersonal conflicts, and rigid IT policies. However, my analysis indicated that these were primarily due to an underlying culture of bureaucratic control that is antithetical to the adaptive co-management framework that Metro Vancouver is seeking to apply through its Park Partnership Initiative. While a focus on more power neutral forums and open dialogue may assist in the communication problems that I have observed, an institutional shift towards a culture that prizes flexibility, collaboration, and transparency is needed to better promote the goals of adaptive co-management. Still, whether an Agile system of governance is operationalized fully, or on a project by project basis, is up for debate.

Chapter 5: Barriers to Stakeholder Engagement

Central to the concept of adaptive co-management is that the complex and dynamic nature of social-ecological systems requires a decision-making framework that embraces a diversity of knowledges, people, and values (M. S. Reed, 2008). Conceptually, it is thought that this will result in better decision making, social learning, and community support for management outcomes (Caves, Bodner, Simms, Fisher, & Robertson, 2013; Freeman, 1984; Knapp et al., 2014). For these reasons, Metro Vancouver has embedded this understanding into their adaptive co-management framework through the Park Partnership Initiative, since 1996. However, even though several benefits have been realized through the public participation that this program fosters, there are organizations and people who feel that they have been left out of the management process.

In this chapter, I begin with a story of stakeholder marginalization as I discuss the difficulties that the Wreck Beach Preservation Society has had in bringing their concerns forward to Metro Vancouver. As discussed in chapter 4, this organization's voice is already filtered through overly structured communication policies implemented by Metro Vancouver's West Area Office. I expand on this narrative by exploring how the Wreck Beach Preservation Society is being devalued by competing stakeholder groups, before investigating an instance where they are in conflict with Metro Vancouver and mainstream stakeholders over by-law enforcement. I conclude this section by looking at how stakeholder engagement might be improved in this case through collaboration, and the formalization of the Pacific Spirit Park Society's role as a bridging organization.

Next, I broaden this discussion to look at the topic of actor-level diversity and access. While much of this thesis has been centered around the role of organizations and institutions, Metro Vancouver Regional Parks has a varied user base, and the task of ensuring that this is well represented has been difficult for many partner organizations. Specifically, I ground my analysis in the experiences of volunteers and staff members from across the Park Partnership Initiative, as they discuss representation and access in regard to age, wealth, race, and ability. By situating these experiences within a broader discussion on collaborative decision-making, I explore how partner organizations are seeking to increase actor-level diversity.

5.1 A Story of Stakeholder Marginalization: The Wreck Beach Preservation Society

The Wreck Beach Preservation Society is a source of local history and knowledge when it comes to the streams, ravines, and cliffs that surround the edges of Pacific Spirit Regional Park. Specifically, they have consistently demonstrated a complex understanding of how these environments have changed over the past fifty years in terms of local wild-life, and public use. In this way, they are an invaluable resource for the management teams at Metro Vancouver's West Area Office, as they tackle significant environmental threats in this area, including cliff erosion, and the degradation of riparian zones. Unfortunately, while Metro Vancouver seeks an adaptive co-management relationship with the Wreck Beach Preservation Society, this community group feels that Metro Vancouver has failed to support them on a number of social and political issues, such as by-law enforcement that enhances the use of Wreck Beach for nudists. Metro Vancouver has consistently opposed the Wreck Beach Preservation Society on such topics and silenced their attempts to disseminate their message on Wreck Beach. This selective stakeholder marginalization has damaged the Wreck Beach Preservation Society's relationship with Metro Vancouver, reduced its legitimacy within wider stakeholder networks, and has negatively impacted the adaptive co-management approach being applied in this space.

In July 2018, as I approached Trail 6 to go down to Wreck Beach, I was welcomed by Susan and several volunteers from the Wreck Beach Preservation Society. They were particularly excited, because today was Wreck Beach Nude Photo Day - a once a year event. I noticed that there were quite a few local news cameras on site and asked one of the volunteers if they were expecting many more. "Probably!" he said. "Susan phoned them all and told them that we're going to try and break the Guinness world record for the most nude people in a photo." He kind of chuckled to himself as he then shared how there was no way that the Wreck Beach Preservation Society was actually going to get that many people signed up for the photo. As I would learn during my time on the beach that summer, when a stakeholder group consistently feels like no one is listening to them, sometimes they have to do whatever they can to get some attention focused on their issues. While the Wreck Beach Preservation Society is consistently consulted with by Metro Vancouver regarding environmental problems, the same cannot be said regarding social and political issues, like nudism. They often have to turn to media stunts and other tactics to have their voices heard.

During her interview with me, Susan explained that the Wreck Beach Preservation Society has a long history of stakeholder marginalization:

“The beginning round tables from which the park management plan was produced were extremely embarrassing and prejudicial to us. The rich people from NW Marine Drive and all along SW Marine Drive, looked down their noses at us, and saw us as the unwashed hippy masses. We were victims of being labelled, and being politely ignored... The image of nudity is always there, and [Metro Vancouver] continually tries to just sweep us under the carpet.”

Susan’s feelings of demonization are not unwarranted. A news article, out of the Georgia Straight (2008), reported how local residents view the Wreck Beach Preservation Society and their fellow beachgoers:

“The people who are moving into University Town are – let me go out on a limb here – not the type to go to Wreck Beach. There’s leftover hippies [at the beach], pot-smoking students. Those who have just paid \$2.5 million for a condo will want something a little more manicured. I want to go for a walk down Trail 7 with my kid without seeing men having sex in the bushes.”

This quote from the Georgia Straight captures the “us” vs. “them” mentality that seems to be fueling the negative relationships between mainstream stakeholders and the Wreck Beach Preservation Society that Susan spoke of in her interview with me. Still, there is more going on here than just stakeholders competing for beach space.

One way to view this problem is through an ontological lens. Bondy and Charles (2018) note the importance of the concept of alterity, or “otherness,” in their work on the role of group identities in stakeholder marginalization. That is, land management agencies and powerful stakeholders, tend to view themselves as representations of what is “natural” or “right,” and the further other organizations differ from this collective self-image, the more they are considered as “unnatural” or “wrong” (Bondy & Charles, 2018). In the case of the Wreck Beach Preservation Society, their nudity and identity as activists is cast as different from main-stream actors in the area who are generally embarrassed by their own nudity and more interested in Wreck Beach as a recreational or management space, rather than a spiritual one. In addition, the Wreck Beach Preservation Society members are grouped together with “beach degenerates,” such as drug users

and exhibitionists. By separating themselves from the Wreck Beach Preservation Society morally, main-stream stakeholders rationalize their devaluation of this organization as both acceptable, and an ethical imperative. Reflexively, however, this is not one-sided. During my time on the beach, I heard the terms “textile” (used to describe those who were clothed), “yuppie,” and “gawker” issued with little forethought by many members of the society. Just as mainstream groups have cast the Wreck Beach Preservation Society in a negative light, so too has the Wreck Beach Preservation Society created their own stereotypes for those who differ from them. In addition, this collective “calling out” behavior by the Wreck Beach Preservation Society provides a sense of pride in its membership as they defend beach etiquette together, further strengthening group cohesion via peer reinforcement.

While this relational approach to understanding the psychology of stakeholder marginalization is useful when trying to uncover the underlying mechanisms of behavior, it also does little to highlight the experiences of those actually being impacted. My discussions with volunteers from the Wreck Beach Preservation Society revealed feelings of anger, frustration, and fear, with many worried that, one day, they would no longer be welcome in the place that they consider their home. For those who have been long time defenders of Wreck Beach, this place is not just sand and waves. Wreck Beach is where their community is, where their friends are, and even the place where some made their marriage vows. For members of the Wreck Beach Preservation Society, stakeholder marginalization is a feeling of powerlessness when confronted by local managers who they feel are ignoring them.

In the following subsection I will further ground this understanding of stakeholder marginalization in an example of by-law enforcement. The Wreck Beach Preservation Society, and other naturists on the beach, have a long-standing rule that there should be no cameras. However, Metro Vancouver not only disagrees with this rule, but has gone so far as to physically remove their signs advocating for it.

5.1.1 Voyeurism and Cameras on Wreck Beach

On Nude Photo Day, as I continued my way down the Wreck Beach Stairs at Trail 6, I was finally greeted by a woman named Jacky who was setting up registration. She immediately knew who I was; after all, I was the only person she was expecting at their tent who would be

wearing shorts that day. She lightly teased me about how I should just go with the flow and let it all hang out, but I politely declined, explaining that I wasn't sure I'd be comfortable conducting interviews while in the nude. This seemed to assuage her fears that I was just a "prude" and she began to happily discuss society matters with me. However, not five minutes into our conversation her face suddenly darkened as she excused herself. She began marching towards the Trail 6 stairs where three women from UBC were standing in their swimwear with their cameras out. "You can't take photos here!" Jacky loudly explained to them. "There are some people down here who might not want their photos taken, and if you piss off the wrong sort, they'll take your camera and throw it in the ocean!" Though the girls tried to explain that they were only taking photos of the many tie-dyed blankets that were at a stall next to us, they eventually just gave up and put their phones into their beach bags. As Jacky came back and continued setting-up, I heard her mutter something about "textiles" under her breath.

This same scene would play throughout the day with several different members of the Wreck Beach Preservation Society and the public. Some beachgoers would point out the hypocrisy of banning phones on Nude Photo Day, but were told that the photographer would be taking that photo in a designated area, and that only people who wanted to be on film would have their photo taken. When I asked Jacky later on if she was annoyed by the people who had their cameras with them, she explained the society's stance:

"It's about respect. We don't want gawkers down here with cameras making people feel uncomfortable. It's also about safety though too. I've seen people take an innocent picture and get the crap beaten out of them because someone thought that they were perving on them."

Though I had not understood it before, the Wreck Beach Preservation Society's stance on cameras was not just about their own wants and needs; as you would expect from true stewards of the beach, they were just as worried about the public safety of their fellow beachgoers. Where Jacky's earlier rant at the three girls had seemed aggressive to me at first, I now saw it as sort of motherly wag of the finger - as though she was telling off three children who were about to touch a hot stove.

As I continued to investigate this matter through my formal interviews, I was surprised to find that that Metro Vancouver was contesting the actions being taken by the Wreck Beach

Preservation Society down on the beach, in regard to cameras. While interviewing Peter, the park operations manager, I found out that Metro Vancouver does not actually have a rule regarding photography. In fact, he was quite specific about their stance:

“The law of the land is very clear on this. Pictures can be taken on the beach. It is a public place.... Within the community, there is one group, [the Wreck Beach Preservation Society], that is determined to promote the beach as nude only, and so we’ve had many conversations with them at meetings about how this is not a nude only beach - it is a clothing optional beach.”

Meanwhile, Susan expanded on this situation by explaining how far Metro Vancouver has gone in this disagreement:

“We’ve put up some really creative posters illustrated by [one of our volunteers]. There’s one that includes a camera and a strike through it.... [Peter] takes them down every time I put [them] up... Now Peter has started taking the posters down from the kiosk, and they’ve reduced our posting space on it to 11x17 [inches]. It’s really frustrating. Some of those posters are expensive for us to produce and laminate.”

Adaptive co-management, of which adaptive governance is a part, can exist in many different forms depending on the level of power sharing that is involved. Similarly, governance can take different forms, depending on whether it is institutionalized or emerges from social interactions in the form of norms (Lebel et al., 2006). Due to the polycentric institutional nature of adaptive co-management, a mixture of these forms of governance often exists, nested within the links between quasi-autonomous organizations or groups of stakeholders specific to an ecosystem (Folke et al., 2005). While the vertical linkages of power that exist within these governance networks can boost adaptive co-management where collaboration exists, these linkages can also stifle it when regulatory structures undermine informal local systems, and limit the ability of co-managers to exploit the collaborative capacity of stakeholder, or interorganizational networks (Folke et al., 2005; Imperial, 2001; Young, 2002). In the case of cameras on Wreck Beach, informal systems of governance existed in this space long before Wreck Beach became part of the Regional Park System in 1989 (Raptis & Cooper, 2015). Indeed, those who have been members of the Wreck Beach Preservation Society since the mid-1960s, cannot remember a time when they did not take on this duty of self-policing the beach.

However, as Metro Vancouver has sought to enforce the law of the land, or the right of people to take photos in a public place, they have unsettled a settled norm through the introduction of unneeded regulation. Additionally, through the destruction of the Wreck Beach Preservation Society signage, they have publicly questioned the legitimacy of this organization's authority on Wreck Beach, and that has resulted in a loss of status within the wider stakeholder network.

As these sorts of actions have continued, exacerbated by additional disagreements and interpersonal conflicts, the Wreck Beach Preservation Society's legitimacy has continued to progressively decline as Metro Vancouver managers have ceased coming to their meetings and their connection to other staff has been filtered through communication gatekeepers. In other words, the Wreck Beach Preservation Society's position as a stakeholder has been marginalized.

The question now is: what can be done? How can relationships be repaired? Adaptive co-management arrangements are not just about collaboration and the co-production of projects and programs, the creation of which somehow spontaneously develop into relationships of power sharing. Underlying this is the building of trust between people and organizations - social capital (Singleton, 1998). Just as an ethnographer does not build field relationships overnight, so too is co-management a process. As Berkes (2009) explains, "co-management involves institution building, the development of trust and social capital, and generally a long voyage on a bumpy road" (p. 1694). If those at Metro Vancouver are serious when they say that they want to include the Wreck Beach Preservation Society within an adaptive co-management framework, they are going to have to begin rebuilding that lost social capital through more effective stakeholder engagement and collaboration.

5.1.2 Empowering Stakeholders through Collaboration

Perhaps one way that Metro Vancouver might seek to repair their relationship with the Wreck Beach Preservation Society, would be to learn from positive examples of ecological co-management that the two organizations have previously engaged in, and then apply similar tactics to how they approach social and political issues at Wreck Beach. Without fail, those positive examples of adaptive co-management that I witnessed between Metro Vancouver and the Wreck Beach Preservation Society began with broad stakeholder outreach that brought Metro Vancouver, the Wreck Beach Preservation Society, and other organizations into conversation so

that all could discuss their goals for the project at hand. Following this, Metro Vancouver mediated negotiations, while also making their requirements clear. A plan for moving forward was then co-produced by all parties, and where possible, this was enacted using volunteer labor in order to ensure both community buy-in and ownership of the project. Particularly successful, were those instances where volunteers from multiple organizations worked side by side, which strengthened stakeholder networks for future projects.

Savage et al. (2010) also point to the need for an appreciative component when engaging in these sorts of collaborative pursuits. In cases where there are multiple stakeholders interacting within a co-management environment, these potential partners need to perceive that they can accrue some advantage by joining forces (Savage et al., 2010). In regards to the marginalization that the Wreck Beach Preservation Society has suffered along social and political lines, the reason that co-management is likely breaking down is because there is no shared goal or value that has resulted in the need for this stakeholder group and Metro Vancouver to collaborate on some of these issues (Gray, 1989). For example, rather than a focus on the benefits of nudism, or the rights of locals to take photos in public, perhaps this issue could be recast as a need to educate the public about etiquette on clothing-optional beaches. While this would not out-law cameras, it would hopefully result in more judicious and respectful use of them, which would be in the best interests of all parties involved. This type of environment would also be conducive towards the co-production of signage and new by-laws, the creation of which may assist in fostering more integrated memberships across stakeholder groups, and a collective identity as “beach users” (Lawrence, 2002).

Still, even where compromise does occur, and there is a desire to collaborate, such projects will not come to fruition without the necessary resources that partners need to approach the problem at hand (Savage et al., 2010). This may pose a significant barrier moving forward for the Wreck Beach Preservation Society and Metro Vancouver. One reason for this is that the Wreck Beach Preservation Society does not receive any sort of annual funding from Metro Vancouver. Unlike the Pacific Spirit Park Society, which is the registered park association for Pacific Spirit Regional Park, of which Wreck Beach is a part, the Wreck Beach Preservation Society is a park partner. This distinction means that the Pacific Spirit Park Society receives \$15,000 per year to offset funding issues, while the Wreck Beach Preservation Society makes

due with public fundraising. Additionally, while Metro Vancouver is quick to provide funding and tools to solve a host of ecological issues in the park, much less capital is invested towards ensuring the health of social and political landscapes, as I discussed in Chapter 3. Those funds that do exist, tend to be spent on nature interpretation, which bridges social, political, and environmental needs – in essence, where funding is limited, synergy becomes key.

Given these relational and funding related barriers, Metro Vancouver may want to consider formalizing the Pacific Spirit Park Society's role as a bridging organization to help empower the Wreck Beach Preservation Society through shared funding of these projects, and to provide conflict mediation moving forward.

Bridging organizations link multiple stakeholders together within governance frameworks so that problems can be solved that no one group would have been able to adequately address on their own (Brown, 1991, 1993). More specifically, they are central to the emergence of functional, value-added networks of organizations (Westley & Vredenburg, 1991). Although these organizations are separate entities in terms of resources and personnel, bridging organizations provide horizontal linkages between multiple stakeholder groups, and vertical linkages between stakeholders and government institutions within multi-level management schemes like adaptive co-management (Crona & Parker, 2012). Within the adaptive co-management context, they are also thought to provide spaces for interorganizational learning, trust building, and conflict resolution (Crona & Parker, 2012).

Regarding the Park Partnership Initiative, park associations fulfill this role. In the case of the Pacific Spirit Park Society, this organization was specifically designed to act as a strategic bridge to other stakeholder organizations in the park, having been created from over thirty disparate groups that already existed within this management space. Indeed, some of these organizations, like the Wreck Beach Preservation Society, even have representatives who sit on the Pacific Spirit Park Society Board. In this case, the Pacific Spirit Park Society is in a strong position to assist in raising project funds, to act as a mediator between organizations that may have value disagreements, and to act as a broker of information and knowledge (Stewart & Tyler, 2019).

With this in mind though, it is important to understand that bridging organizations also raise conceptual and practical issues in their own right. While some theorists have been keen to

promote groups like the Pacific Spirit Park Society as a power neutral forum in which stakeholders might be placed on an equal footing (Crona & Parker, 2012; Stewart & Tyler, 2019), these bridging organizations are still distinct entities with their own goals and values as well. As Westly and Vredenburg (1991) note, bridging organizations are also stakeholders. While they may be key in the formation of collaborative networks, they also have to play a dual role of both broker and agent when it comes to dispute resolution and mediation. This can result in significant organizational stress, and also opens up mediation to conflicts of interest (Westley & Vredenburg, 1991). For example, since the Pacific Spirit Park Society receives its funding through Metro Vancouver, it may be more likely to side with them in negotiations, resulting in the Wreck Beach Preservation Society being placed within a decision-making framework where it is even more marginalized than before. Additionally, because a power neutral forum does not truly exist, those stakeholders who are not marginalized, or who simply have more experience negotiating within these types of collaborative networks, are still going to have an upper hand (Shilling, London, & Liévanos, 2009). Bridging organizations are certainly not miracle workers, and those groups who operate at the edges of these collaborative networks due to their values and goals, are still going to face difficulties at the negotiating table.

Nevertheless, these obstacles are not insurmountable. During my time working with the Pacific Spirit Park Society, I have found that it has been particularly resilient to many of these issues, because of its incredibly diverse board of directors who volunteer with multiple organizations. Due to this diversity, a wide number of organizations already have pockets of support within the society. Additionally, because of the positive, long-standing nature of its relationships with organizations like the Wreck Beach Preservation Society, the Pacific Spirit Park Society has cultivated a great deal of trust, and this can be called on when facilitating projects or mediating conflicts. Still, while the Pacific Spirit Park Society does operate as a bridging organization, it does so mostly unknowingly and as part of its mandate to connect park users. If this role is to be operationalized more effectively within Metro Vancouver's adaptive co-management framework, then steps need to be taken to formalize it.

5.2 Actor-Level Diversity

Although a defining characteristic of adaptive co-management is that it incorporates a diversity of knowledges, opinions, values, and experiences, my review of the literature has shown that actor-level diversity is largely ignored in this field. A recent, systematic review of literature on the adaptive co-management of watersheds found similar results, and reported that the scale of diversity typically engaged with by theorists was at the institutional or organizational level (d'Armengol, Prieto Castillo, Ruiz-Mallén, & Corbera, 2018). Generally, natural resource managers are more interested in diversity at the scale of partner organizations, since they still provide a multitude of strategies, labor-options, and knowledge types while also meeting a moral call to ensure democratic governance (Baird, Plummer, Schultz, Armitage, & Bodin, 2019). In addition, I have found in my dealings with Metro Vancouver that the responsibility for actor-level diversity can be passed on to community-organizations in such cases. In general, natural resource management team members that I spoke to cared more about having a specific number of volunteers to do a job, rather than who was being represented within that group. Indeed, when asked if they had implemented any strategies to increase the cultural diversity of their volunteer base, one of Metro Vancouver's natural resource managers had this to say:

“As we discussed at the beginning, I'm mostly reactive. I've always kind of been reacting to who wants to work with me, and not really having to [worry about recruitment], because I work in such amazing places and I have volunteers coming to me... I don't really have to recruit.... I'm reacting to who wants to volunteer, wherever they come from, and I'm not necessarily checking their background in anyway.... It's a good role for the park partner, if they have the capacity to do that though.”

Those studying the impact of increased actor-level diversity on adaptive co-management have found that increasing this supports the ability of groups to identify and prioritize management issues, while also providing a range of innovative solutions to problems (Baird et al., 2019; Koontz & Johnson, 2004). Nevertheless, natural resource managers have also reported tensions related to the time investment needed to maintain high levels of diversity, while still achieving tangible outcomes. With the responsibility of actor-level diversity largely falling to community organizations, one of my primary questions throughout this study has been how these

groups are ensuring a broad representation of different actors in both their volunteer base and at the board level. The short answer is: they are not.

In the following sections I highlight my findings regarding barriers to representation and access within the Park Partnership Program. Specifically, these fell under four primary dimensions of actor-level diversity: age, socioeconomic status, race, and ability. Before I begin though, a note: each of these topics are not only immensely complex, but intersect with one another, and could be the topic of their own independent investigation. I mention this now, as I will only be examining those barriers to representation that were reported to me, or which I witnessed first-hand. By no means do I intend to provide a comprehensive discussion on these topics; rather, I seek to pass on these experiences that participants were willing to share, while situating them within the broader context of adaptive co-management.

5.2.1 Community Representation: Old, Rich, White, and Able

In 2015, when I first joined the Pacific Spirit Park Society, I was invited to the home of their treasurer for a meeting with the society's executive, and the West Area Office's community development coordinator. They wanted to meet me, in order to gauge my interest in becoming a board member. As I walked up to the multi-million-dollar home in the affluent, park-adjacent neighborhood where the meeting would be held, I marveled at the class of my surroundings, and also worried how I would fit in. After all, I was just an undergraduate student at the time, and certainly did not consider myself a likely peer to the owner of this home: a retired physics professor from the nearby university who clearly had far more resources than I could ever dream of at the time.

Knocking on the door, I was greeted by his wife, the secretary for the society, and their two small dogs. She led me into the kitchen where tea had been prepared, and introduced me to the president of the society and the community development coordinator. Together, they also introduced me to an elderly military veteran who was also interested in taking on a board position. I was clearly nervous and well outside my element, but they were warm and welcoming – asking me about my previous work experience, my schooling, and the like. Society business was taken care of on a sporadic basis throughout the meeting as we chatted about the secretary's recent trip overseas, the president's biking expedition, and sipped earl-grey in between stories.

Looking back on this meeting now, I realize how representative this group was of the many boards I have worked with during my research on the Park Partnership Initiative. To put it bluntly, they were old, rich, white, and able.

5.2.2 Age

Age was the most commonly cited concern regarding diversity when I spoke with both Metro Vancouver Staff and partner organizations:

“There is definitely an overall, general feeling that there is a lot of older boards, of people who would like to pass it on to the younger generation and they’re saying that they don’t exist.”

-Rebecca, West Area Office

“I’m not able to pull weeds much anymore, so I’m mostly focused on making sure our volunteer leaders are trained well. I worked on the by-laws some this year, and I do some other board work when I have free time.”

-Eric, Burnaby Lake Parks Association.

Of particular note regarding age, was the contrast between volunteers and board members within these partner organizations. While boards members were primarily those of retirement age or older, most program volunteers and leaders were university age. Those volunteers that I interviewed and spoke with in the field generally wanted to improve their resumé and to gain skills that complemented the classes they were taking. Meanwhile, most board members explained that they had a long history with their organizations and had transitioned to their position. Many older board members explained that they were missing certain skill sets because of the demographics of their board.

“Our board really needs some more youth on it. Until we got a couple of young people like yourself [motions at me], we weren’t really using our website or social media at all. There’s a lot of skills and benefits that young people bring with them, and I think we’re missing out on that.”

- Calvin, Pacific Spirit Park Society

As noted in Chapter 3, and in line with Calvin’s quote, those boards without younger members were much less likely to be implementing citizen monitoring or other technology

driven programs. Additionally, many older board members brought up the prospect of having no one to pass on these partner organizations to if younger members did not decide to take up board positions. Rebecca, from the West Area Office had an interesting take on this predicament:

“The younger demographic, they’re post-secondary students and they are not looking to be board members. They might not stick around, because they need to get a job, and they might fly off in a minute. So, they are not the kind of people that you really want on a board, unless they can commit to staying for two years or something. So, that’s kind of the trick. Maybe they need to be looking towards new retirees? Maybe they’re thinking young people, but maybe they should be thinking sixty-five, cause they’re eighty.”

Corresponding to what Rebecca said, my review of partner records confirmed that younger volunteers primarily cited the end of high school or their university education as the reason for leaving the community-based organizations that I worked with. Given the short period of time many of these students were active volunteers, it is unlikely that they would be able to fulfill a two-year term as a director. Problematically, there are significant differences in how young and old park users utilize park space for recreation and other needs. Without representation for younger users on the board, the activity levels and forms of recreation being suggested by partner organizations may not correspond to the needs of the wider park userbase (J. A. Reed, Price, Grost, & Mantinan, 2012).

Another often cited aspect of these park user demographics was the lack of representation for young families and professionals. Despite how common these users are in regional parks, they do not have a strong voice when it comes to the management of these spaces. During my time attending board meetings, this came up often as there has recently been a great deal of off-trail play in several areas of Pacific Spirit Regional Park; yet, there is difficulty in communicating with the families of these children to try and curtail this activity. Similar demographic gaps appear within citizen science volunteer bases, with low representation at the community group level being attributed to a lack of available time or resources. Simply put, these young families and professionals are too busy with their lives and careers to volunteer with local partner groups (Dickinson & Bonney, 2012).

5.2.3 Socioeconomic Status

Besides age, socioeconomic status was also mentioned by several interviewees and volunteers when discussing diversity and representation. Generally, there is very little representation for individuals of low socioeconomic status on partner boards, and in my review of board minutes, there is a lack of advocacy present as well. The majority of board members that I met are retired, previously high earning individuals, who also own land in and around the parks that they now watch over. Increasing representation is not simply a matter of volunteer outreach in this case either. Much like young families, low-earning park users are not likely to have the time and resources to participate in the programming that makes up a large portion of Metro Vancouver's public engagement.

Specifically, my study participants seemed concerned about two issues in relation to socioeconomic status: a lack of access for low income children who would benefit from partner programming, and the overrepresentation of local land owners living near regional parks.

Myra, who is a school teacher with decades of experience in environmental education, and a regular volunteer with the Pacific Spirit Park Society, explained how she felt children from poorer schools were both underrepresented by the society and lacking access to parkland:

“These kids, they’re amazing kids, but they don’t come from advantaged backgrounds. When they want to go on a field trip to the park, the school makes each child pay \$20, because their policies require them to hire a substitute while the other teacher is away. For most of these kids, that \$20 is five days of lunches. So... they don’t get to go to the park. I know you’ve done some programming for disadvantaged kids, but there needs to be more. Couldn’t Metro Vancouver or Pacific Spirit Park Society help fund these kids?”

Environmental education serves to empower youth in this community by providing awareness, knowledge, skills, and a sense of urgency to begin engaging with complex social-ecological challenges, such as global climate change or the health of our local parks (Gallay, Marckini-Polk, Schroeder, & Flanagan, 2016; Pigozzi, 2010; Stevenson, 2007). For these children, and by extension their families, to be underrepresented within the programming that partner organizations are offering is unjust, and their ensuing lack of visibility by program leaders means that they will be further marginalized as stakeholders within collaborative planning processes. Though the Pacific Spirit Park Society has taken some steps to engage with

this issue, the same cannot be said of other partners within the Park Partnership Initiative. Further, the after-school programming that Pacific Spirit Park Society has run with economically disadvantaged youth is mostly reactive, and in response to requests made by other non-profits in the area. Those volunteers I spoke with who mentioned this as a barrier, believe a more proactive approach towards inclusion is needed in ensure a wider representation of socioeconomic statuses within core programs.

Compared to those of low socioeconomic status who are rendered less visible due to a lack of representation, those of high economic status are over-represented. Primarily, this seems due to the considerable power that nearby landowners have amassed in regional park management. Both Belcarra Regional Park and Pacific Spirit Regional Park are near affluent residential districts. In the case of Pacific Spirit Regional Park, these residences have even begun to threaten the park itself, as pieces have been sold off for development. Generally, these homeowners' interests are so well represented, because their economic wealth has provided them both the resources and time to negotiate with Metro Vancouver through not just local park associations, but lawyers, local government officials, and neighborhood collectives as well.

One only needs to look at the example of Little Australia, a small residential hub on the east side of Pacific Spirit Regional Park, to see the stakeholder power enjoyed by such community groups. In 2016, as Metro Vancouver sought out a new location for a service yard in Pacific Spirit Regional Park, it was briefly mentioned that an area adjacent to a triangular grass field at the edge of the Little Australia community would be up for consideration. The pushback by local residents was not just well funded, but organized. Within a month of this announcement, multiple papers had picked up the story in support of the community group, two hundred and fifty residents had signed a change.org petition, and they had reached out to multiple stakeholder groups, including the Pacific Spirit Park Society and the Wreck Beach Preservation Society, for assistance. Within two months, the location had already been removed from the list of proposed sites by Metro Vancouver, who were now explaining the incident away as a cartographic error by their park planners and arguing that they never wanted to place a service yard in Little Australia to begin with.

5.2.4 Race and Culture

Alongside age and socioeconomic status, race and culture were also deemed a barrier when trying to achieve higher actor-level diversity. Generally, the barrier that participants reported experiencing was a lack of representation for “non-white” community members at the board level of partner organizations. However, while participants pointed to this as an obstacle, many found it difficult to articulate why a lack of representation for people of color was a barrier. Those that did generally put forward arguments similar to Marcia’s below:

“There are entire sectors of stakeholders and volunteers that we are not engaging with, because of a lack of diversity. If we could attract more indigenous people or [people of color to our board], then we would be more likely to reach out to those groups.”

- Marcia, Pacific Spirit Park Society

This “business case” for racial and cultural diversity, where people of color represent some sort of untapped volunteer resource, or market, for park associations to access (Weisinger, Borges-Méndez, & Milofsky, 2016), was a subtle, but common form of tokenism that I witnessed during the interview process. Few participants connected the need for increased representation with the desire to implement organizational changes to empower people of color in the wider park community. Nor did the need for increased board diversity correspond to a desire to elevate people of color into positions of power.

One of the few exceptions to these findings was James - a gay, Japanese-Canadian, who only recently became a member of the Pacific Spirit Park Society Board. As a person of color, he shared his experiences of marginalization with me as well as his hopes for a renewed direction for recruitment:

“When I am in the bog working, taking pictures, someone will yell at me ‘Hey, you’re not supposed to be in there!’ It is the tone, they are not asking me why I am in the bog doing what I am doing, but they are telling me that I don’t belong there. It is because I am Japanese, they think I am harvesting something, or taking something that I am not supposed to.”

“I am 53 years old and I have been to a lot of board meetings of different organizations, and they make me go ‘Ah!’ I don’t feel like I belong, I feel like I have to put a lot more social energy into having my voice heard, and because of that I haven’t really wanted to join until now. Now there are some younger people who have joined the [Pacific Spirit Park Society] board - when I talk with them, I don’t feel like I’m being placed in a box. As a Japanese person I feel like I am a bit more privileged compared to other minorities who experience a lot more racism. I think I can help empower those people, while still understanding what it is like to deal with these things.”

Among white participants, I felt that there was an underlying feeling that they were somehow “culture-less,” compared to people of color who were often expected to represent their entire group – to recruit, speak for, and provide the opinion of all black people, all Japanese people, or all indigenous people. James makes it all too clear that this form of tokenism is easily felt in the quotes above. He connects more with younger board members, who do not treat him as a Japanese man who happens to be a board member, but more as a board member who happens to be Japanese. That is, they believe he has everything to offer that other board members do, but in addition, they value his experience as a visible minority and are willing to help magnify his voice if chooses to share those experiences in support of increasing diversity. In terms of race, I do not feel that the barrier to increasing actor-level diversity within the Park Partnership Program is simply a matter of representation in this case. Rather, the obstacle is in re-orienting how people think about race and diversity within partner organizations, and to move towards a model of inclusion that supports people of color in speaking out about their experiences in parks as they feel it is right to do so.

5.2.5 Ability and Access

Many of the barriers to representation I have discussed so far come down to the issue of access. Whether that access is to boardrooms, natural classrooms, recreational areas, or spiritual places, the inability to navigate and utilize these spaces is often at the root of stakeholder marginalization and threats to actor-level diversity in parks management. Proponents of adaptive co-management, like Metro Vancouver, strongly believe that multi-stakeholder collaboration, win-win solutions, and participatory programming will help to overcome unequal access to such spaces (Bondy & Charles, 2018; Brown, 1993; Gobster & Barro, 2000). That is, collaboration and participation may lead to a power shift that will allow for the voices of previously silenced

actors to finally assert their right to be included. However, one must consider that there are also a range of practical factors that impact access to parks. In this section I will discuss another barrier to stakeholder engagement that my participants experienced: level of ability.

During a volunteer appreciation event for the Burnaby Lake Park Association, I had the good fortune to conduct a number of formal interviews in a single sitting. This particular event was at their nature house location, very close to the main road, and for the first time I had the pleasure of meeting a man named Samuel who had not volunteered in Burnaby Lake Regional Park for quite some time. He was in his late 60s, dressed for the rainy weather, and walked with a significant limp on his right side. When he learned of my research, he pulled me aside at one point and asked if I would please include him in my study. He felt that he had something very important to say:

“I had a stroke about a year ago. I was in the hospital for a time, but eventually I was able to go home. But you can’t just sit at home you know; you go crazy if you just sit there. So, I take the bus all over the place and volunteer with a lot of different groups to keep me going. But this is the first time I’ve been able to come out to one of these events, because usually I can’t walk too far in the park. Especially not when it’s raining like this, or when it’s not near a bus stop.”

The first thing I did when Samuel told me this was thank him. I could not believe that a man who had nearly died a year ago, and who clearly had difficulty getting around, wanted to spend his afternoon with a bunch of volunteers, pulling weeds, in the mud and rain. But he did - he explained that he loved volunteering, and that he loved the communities in that area of the city. Before his stroke, he used to come out to Burnaby Lake Regional Park quite often, and this place had many memories for him that he did not want to forget.

Access is not just about economic and cultural patterns. It is just as much about circulation and transportation, and while much time has been spent in this chapter on the topics of place-based meaning and stakeholder conflict, sometimes inclusion can hinge on whether or not there is a robust public transit system servicing a regional park (Low, Taplin, & Scheld, 2005). A lack of access to parks for persons with disabilities is problematic, as those suffering from mobility issues are often provided little access to natural environments, and thus denied a wide range of ecosystem services that these areas provide (Pawlick, 1999).

Allyship and advocacy for those with mobility challenges, like Samuel, can help promote equity in park access (Pawlick, 1999). Additionally, speaking up for management options that promote various types of physical access, and ensuring that program offerings are nearby regular transit access can help promote more inclusive volunteer opportunities for collaborative projects (Low et al., 2005; Pawlick, 1999) The Wreck Beach Preservation Society provided a particularly memorable example of this type of allyship in June, 2016, when they perpetrated a nude protest at a closed down bus stop near one of the popular entrances to Wreck Beach. In a Vancouver Sun article (Eagland, 2016), their president explained that they were worried about young families with strollers, the elderly, and those with mobility challenges being able to access beach resources.

As with bridging organizations, which I discussed earlier in this chapter, informal stakeholder networks can often be key in overcoming barriers to engagement and representation. In the case of the Wreck Beach Preservation Society, they took a more direct approach than most organizations would; however, the key is that they provided tangible support and brought the needs of those forward who may not have been able to physically do so themselves.

5.3 Conclusion

Adaptive co-management excels in environments where a diversity of knowledges, people, and values can come together to solve complex social-ecological issues. However, in this chapter I have shown how both stakeholder marginalization and a lack of diverse representation threaten the participatory nature of the adaptive co-management approach being utilized in Metro Vancouver Regional Parks. The complex stakeholder networks that exist within regional parks offer many opportunities for collaboration, but for those who are not afforded a voice in the decision-making process, or who have their legitimacy questioned by land management authorities, this collaboration can become an exercise in futility.

While bridging organizations, informal stakeholder networks, and allyship can help to combat these threats to participation, there is a lack of formality to these solutions that has led to inconsistent use across the regional park system. In the next chapter, I will conclude this study by taking the lessons learned in this chapter, and those previous, to provide a list of best practices that can be operationalized at a regional level.

Chapter 6: Conclusion

A focus on barriers and obstacles can often give the impression that things are more dire than they seem, but for each example of a failure that I have given in this thesis, know that there is an example of success as well – instances of community members working together with Metro Vancouver to make their regional parks a better place through ecological monitoring, restoration, education, and advocacy. These successes, not the barriers I have reported on, is what inspired me to conduct this research, because adaptive co-management holds a great deal of potential for other regions with similarly complex networks of social-ecological systems.

In Chapter 3, I explored barriers to citizen monitoring, and learned from participants that although funding was a practical barrier to overcome, that this was being driven by a misunderstanding of the collective value of citizen science programs as a whole. A more holistic way of understanding data quality was needed, one that placed actual value on community benefits and other subjective dimensions. In Chapter 4, I looked at the institutional backdrop of the Park Partnership Initiative and followed the prompts of volunteers and Metro Vancouver employees as I looked at systems of communication and technology adoption. A rigid communication policy, driven by human resource limitations and cross-organizational conflict, was stifling collaboration in some areas of the region. Additionally, information technology policies that sought to avoid decentralization through rigid, hierarchical management chains were killing innovation at the partnership level. Finally, in Chapter 5, I delved into the heart of participation within the Park Partnership Initiative – stakeholder engagement. I discussed how stakeholder marginalization was being fueled by difference, and how the formalized use of bridging organizations might allow for stronger networks and more collective action. As well, I looked at the issue of low levels of actor-level diversity at the board level and contemplated what a lack of representation meant for the participatory nature of adaptive co-management.

Collectively, these chapters have also provided broader insights. First, many of these barriers were felt unequally by partner organizations across the region. Even as rigid, bureaucratic structures are fueling barriers in some places, these institutional structures are also acting as a barrier to themselves. That is, the siloing of communication, that is a direct consequence of such forms of management, is leading to Metro Vancouver's own policies failing

to trickle down departmental ladders. Conversely, this is also resulting in concerns regarding these policies failing to reach upper-level management. Coupled with different community outreach philosophies by key employees, like community development coordinators, this results in a wide range of experiences with Metro Vancouver for partner organizations. Moving forward, cross-departmental communication must be improved to help provide partner organizations with a more unified experience.

Secondly, both the Pacific Spirit Park Society and Burnaby Lake Park Society are consistently mentioned by staff as examples to be replicated. However, there is very little communication between partner groups, except in the case of the Pacific Spirit Park Society and the Wreck Beach Preservation Society, who share the same park. If the Park Partnership Initiative is to learn from its successes and mistakes, this learning must occur at a regional level as well. Partner organizations must begin communicating with one another on a regular basis.

Finally, interpersonal relationships are often overlooked due to a macro-level focus on organizations and institutions. To reverse a popular metaphor: we are missing the trees for the forest. Yet, interpersonal conflicts between Metro Vancouver Staff and partner organizations were common throughout this research and should not be ignored by management. As I spoke with Metro Vancouver employees, many were of the opinion that if professionalism and a dedication to multiple viewpoints was adhered to that such issues would somehow disappear. This is not the case. Just as bridging organizations are needed to better connect stakeholders at the organizational level, mediators must be brought in to tackle issues at the personal level. Community development coordinators are the most realistic persons to fulfill such a task and should be called on in these situations.

In this concluding chapter I will complete three final tasks in relation to this research. First, I provide five best practices as they have emerged from my findings and discuss how they might be operationalized. Second, I will discuss the limitations and strengths of this research, particularly in regard to the multiple ethnographic case-study approach I have taken. Finally, I will discuss how this research has added to its field, and what this means for future directions in the research of adaptive co-management and regional parks.

6.1 Five Best Practices Emerging from the Park Partnership Initiative

Five best practices may seem like a small number given the intricacies of the barriers I have discussed throughout this thesis. However, my goal is to provide broad enough lessons that both the Metro Vancouver Park Partnership Initiative and other regional park systems might benefit from them. In each instance, I focus on practical obstacles and what is needed to operationalize these lessons within a system of adaptive co-management.

- i. Internal funding should support citizen science and monitoring efforts in addition to more traditional forms of participatory management.*

When the Park Partnership Initiative was first being conceived, the field of citizen science was only just reimagining itself (Bonney, 1996; Irwin, 1995). Further, it was not until the democratization of GPS in 2000, and the advent of smartphone technology in 2005 that citizen monitoring was realized as a potential way to increase our understanding of regional parkland. With many natural resource management professionals only recently beginning to overcome their fears and predilections regarding citizen science (Kosmala et al., 2016), it is understandable that funding structures have not fully embraced citizen monitoring yet. While it may not be possible to change the views of external funding agencies (that may only come with time), land management agencies can begin re-orienting their internal funding policies now.

Internal funding is often allocated by a board of directors, within which there are varying degrees of proficiency and knowledge on topics such as ecology, data collection, etc. In the case of the Pacific Parklands Foundation, which is Metro Vancouver's primary charity arm, the board of directors is composed of many different types of professionals who are largely unaware of the intricacies of natural resource management. They are lawyers, doctors, and local business owners who are rounding out their professional lives by providing their time to this philanthropic organization. For laypeople, the tangibility of planting trees, ripping out invasive species, teaching children about the environment, and even protesting, are all easy to envision as working towards the ecological health of parkland. They may have even participated in some of these activities on their own. Citizen monitoring is largely intangible, with outputs such as: numbers, statistics, spreadsheets, and databases. Indeed, three years of work may result in only a single

valuable map of the distribution of invasive species throughout a park, as has been the case with the Pacific Spirit Park Society's Invasive Species Mapping Program. There is nothing to place a golden shovel in, and no pictures with weary volunteers to be taken for funders. In short, citizen science is an enigma for these boards, and we have to overcome this.

First, citizen monitoring can be made more legible through economics. Natural resource managers, whose labor would normally be put towards these monitoring efforts, can assist in this by providing partner organizations with equivalency statistics. That is, calculate how much labor has been contributed by citizen monitoring, and provide a dollar value to associate with it. While your average citizen may not understand the significance of a single map, they will likely understand the impact of \$14,500 of additional staff time - this is the dollar figure associated with the Pacific Spirit Park Society's Invasive Species Mapping Program for 2018. At present, this data is often guarded by land managers, because they do not want volunteers to misinterpret such statistics. They want volunteers to know that they are valued as much for their local knowledge, keen insights, and community involvement, as they are for their labor. Nevertheless, these statistics carry a great deal of weight for funding boards who want to allocate their money so that it has the greatest impact overall. This information should be shared and used.

Second, citizen monitoring can be made more legible through experience. Grant reporting structures are largely the same across land management organizations and even external funding bodies. Generally, a report that details that the work that was done is expected alongside a collection of receipts to show that money was spent as promised. In the case of Metro Vancouver, this is sometimes given as a presentation to their board of directors, once every three years. These reporting structures do little to provide a sense of tangibility when it comes to citizen science. I recommend that invitations be provided to funders to take part in a day of participation themselves. With a GPS unit in one hand and a tablet in the other, they are much more likely to make a connection between the data and labor involved. This is already being done with more traditional approaches to participatory management, like tree planting. I have yet to meet a funder who does not want a photo opportunity with their hands on a shovel as it is pressed firmly into the earth. Why should citizen monitoring not benefit from the same type of exposure?

Finally, citizen monitoring can be made more legible by tying it to more traditional forms of participation in environmental management. As these forms of participation, like invasive species removal, tree planting, and environmental education, are already accepted by many internal funding boards, tying citizen monitoring to these activities may assist in broadening its appeal. For example, when conducting a one-year tree planting project, additional funds might be applied for to pay for monthly monitoring of the restoration site to ensure that the growth of invasive species does not threaten the newly planted trees. By incorporating citizen monitoring in this way, it becomes normalized, and may eventually become standard practice.

- ii. *A holistic view of data quality should be upheld formally, and value should be given to both subjective and objective dimensions of data, based on the needs of both end-users and data collectors.*

As my work with the Belcarra BeachKeepers showed, subjective dimensions of data quality are already celebrated by land managers and funders informally. The issue is that we do not place the same type of value on benefits like scientific literacy, community building, and democratic governance that we do on accurate or complete data. That is, the former dimensions of data quality are not considered goals of citizen monitoring in and of themselves; instead, they are seen as positive by-products. We must reorient the way that land managers and communities view citizen science and the data it provides (Fernandez-Gimenez et al., 2008; Pandya, 2012). In chapter 3, I provided a holistic data quality assessment framework (Figure 3.1, p. 55) that was developed by Pipino et al. (2002). The implementation of this framework would be a step in the right direction, as partner organizations try to shift how people understand citizen science. Not only does this framework recognize subjective dimensions of data quality as a core goal of citizen monitoring programs, but it encourages their development and improvement over time. Still, if this framework is to be operationalized, at a regional scale, there are issues that must be considered.

First, assessment generally requires a metric, or some way to gauge the overall effectiveness of citizen monitoring. This assessment does need not be quantitative, as I discussed in the case of added value emerging from the integration of indigenous knowledge; rather, a

mixture of ground truthing, educational evaluation, focus groups, and other approaches may be used as necessary. Although these forms of assessment may not always be able to speak to one another, or allow for cross-analysis, this does not mean that they cannot be understood collectively and combined in an integrative manner. However, this would require professionals of multiple backgrounds and skills working together throughout the assessment process.

This brings up the second requirement to implementing a holistic data quality assessment framework: human resources. As I discussed multiple times in this thesis, human resources are in short demand for land management organizations in general, not just Metro Vancouver. One of the primary reasons that land managers are so quick to support participatory approaches to adaptive co-management, is that community volunteers help to shore up a substantial labor shortfall (Dickinson et al., 2010; Folke et al., 2005; Plummer et al., 2012). Those natural resource management team members I spoke to at Metro Vancouver were worried that the practices needed to maintain this sort of data quality assessment would be too great, and that time would be taken away from actually running programs. Many of them did not even have time to conduct more traditional assessments on accuracy, as I did through my ground truth analysis. The thought of having to include interviews or testing seemed to overwhelm many of them.

These concerns should be respected, and we must adjust how and when quality assessment is conducted due to these constraints. Rather than committing ongoing staff time to these procedures, many traditional quality assessments could be offset to the volunteers who are collecting data to begin with. To use the Pacific Spirit Park Society's Invasive Species Mapping Program as an example once again, a group of volunteers could be used to ground truth data once every six months on a subset of collected data. Alternatively, a picture could be taken as part of data collection procedures, with volunteers and experts providing their quality assessment as to whether or not identification was correct on a more leisurely basis (Vahidi, Klinkenberg, & Yan, 2018). In regard to collecting metrics on more subjective dimensions of data quality, interviews could be offset to community development coordinators, as part of their position is to conduct check-ins and other forms of qualitative assessment for program health. Educational metrics could be integrated into the ongoing training of volunteers with evaluative questions being asked before training, and after a six-month period. While a pool of questions would need to be

developed, the actual task of delivering and evaluating responses could be automated using survey software that is widely available for free online.

Finally, the iterative nature of this holistic data quality assessment framework necessitates ongoing training so that the effectiveness of both subjective and objective dimensions of data quality can be enhanced. While iterative training regiments are already a common quality assurance procedure (Dickinson & Bonney, 2012, 2012; Kosmala et al., 2016), the nature of this training will require a wider range of expertise than before. Organizations, like Metro Vancouver, may be able to meet these demands through cross-departmental ownership of citizen monitoring programs. While natural resource managers can continue to assist in the iterative development of more objective aspects of quality control, nature interpretation specialists and community development coordinators would be able to provide valuable insights on increasing the effectiveness of the educational and outreach components of these programs.

iii. Communication procedures should be flexible, and support informed decision making, transparency, and the development of informal networks.

The relationships between Burnaby Lake Park Association directors and Metro Vancouver staff is proof that rigid communication policies are not required within an adaptive co-management relationship. As discussed in Chapter 4, these types of policies tend to limit the ability of community partners and professional staff to exploit the collaborative capacity of interorganizational networks (Folke et al., 2005). These networks allow for free-flowing ideas as actors can communicate without the scrutiny of their home organizations, think more creatively, and form project teams that may not have been possible with the expertise available from any one organization (Allen & Gunderson, 2011; Folke et al., 2005). However, facilitating these sorts of flexible communication networks can be difficult.

Positions that acts as contact points between organizations, like community development coordinators at Metro Vancouver, must not become gatekeepers. While certain types of relationships necessitate gatekeepers, those that are expected within an adaptive co-management framework simply do not benefit from this type of structure. From my experience within the Park Partnership Initiative, gatekeeper tendencies are exhibited when communication results in

organizational stress. Joint work planning has worked well in these circumstances, particularly where human resources were of concern, and should be implemented when possible. Generally speaking, joint work planning requires stakeholders and partner organizations to come to a meeting with their requests for any collaborative projects that may require staff time – the land management agency does the same. Timelines are set out against each other to determine which projects are possible in the coming year, and both volunteers and staff pledge resources towards projects of interest, as necessary. This provides a useful type of structure – an agreed upon date to begin collaboration is often set, and a rudimentary team may form as professionals and volunteers learn of project ideas that they would like to be involved in. During the year, when a partner organization attempts to call upon human resources that have not already been pledged, joint work planning provides a reasonable foundation from which to deny these requests.

Gatekeepers roles also tended to be used when interpersonal conflicts or combative approaches to environmentalism by stakeholder groups were present. However, these issues seemed to be in reaction to non-transparent procedures and a lack of information regarding the management of parkland. In those cases where Metro Vancouver provided partner organizations with complete information from which they could form a position, negotiations and idea sharing did not suffer from these issues to the same degree. This was particularly true when community members felt that their consultation could result in change. Overwhelmingly, participants pointed to seven rules that they would like to see implemented when land managers consult with stakeholders:

1. Consultation should be conducted before, not after the fact;
2. The process should be ongoing, in case things change;
3. The process should be transparent, with full disclosure of information, and the extent to which stakeholders can influence the project should be known;
4. The process should be documented so that people and organizations can be held accountable;
5. Consultation should not be held for its own sake, or because of a requirement, but only when stakeholder input is required and valued;

6. There should be no coercion or threats of reduced funding, or lack of collaboration for future projects, when stakeholders disagree with land managers;
7. Those groups who hold the least power should be given priority at meetings to ensure that their voices are heard.

Finally, while flexible communication and information sharing was valued by both natural resource managers and partner organizations, many pointed to the fact that there were very few tools available to help them collaborate. Community development coordinators are useful when staff need to be introduced to volunteers within partner organizations, but once this is done, these collaborators need a way to both communicate and share documentation with one another. Online project management software, forums, and document repositories like Google Drive could be implemented as quick fixes here. Unfortunately, I found that these types of software were rarely used by partner organizations. This was most often due to regulatory restrictions on how certain information could be shared and stored by Metro Vancouver, and a lack of computer literacy in older board members. In cases where these additional barriers are present, workshops were shown to be extremely effective at overcoming issues of computer illiteracy within the Park Partnership Initiative. Additionally, in-house alternatives to document repositories could be created using intranet solutions, thereby limiting access to a single network within a central organization. This would help to overcome the regulatory restrictions on information sharing and storage that Metro Vancouver currently imposes on staff.

- iv. Agile IT policies should replace hierarchical models that inhibit innovation and promote unsustainable workarounds.*

The bureaucratic nature of many land management organizations, such as Metro Vancouver, results in centralized systems of IT management that are generally unable to adapt to unexpected requests in a timely manner (Lappi et al., 2018). Shadow IT, or the creation of technical workarounds that central IT managers are not aware of, are prevalent within these types of environments. This is problematic due to the possibility of sudden strains on human resources, as well as threats to IT stability and security (Zimmermann et al., 2017). In Chapter 4, I

recommended that a culture shift should occur within these land management institutions that would allow for the use of Agile IT management, which is more conducive to an adaptive co-management approach. Not only do Agile approaches to IT excel in collaborative environments, but the novel workarounds they encourage allow for the reactionary development of new technology that would not be sustainable within more centralized systems of IT management (Dybå & Dingsøyr, 2008; Lappi et al., 2018). Still, although Agile IT has many benefits, there are also difficulties in its implementation.

Regardless of the collaborative nature of Agile IT, adaptive co-management is rarely implemented to such a degree that devolution results in equal partnerships. Rather, partial devolution is much more common, leading to unequal decision-making power between land managers and partner organizations (Cronkleton et al., 2012). Due to this, the flexible and organic team building that is so central to Agile IT, may not be fully realized within co-management frameworks. While some have pointed to this as a potential problem for more traditional IT environments as they transition to Agile IT (Lappi et al., 2018), given that other forms of co-production have been successful, I don't think that this would pose a significant problem for participants in this study. As both professionals and volunteers are operating within the Park Partnership Initiative, it is not uncommon for volunteers to depend on the technical skills of Metro Vancouver Staff – this situation would be unlikely to change in this environment, due to the technical skills involved in IT development.

Co-production within environments like that created by the Park Partnership Initiative may offset some of the problems with Agile IT development – namely, threats to IT system stability and security. In the case of partner groups who intend to use IT materials in citizen science programming, this technology is likely to be tested within an IT environment that is separate from that of the land management organization. Further, the IT infrastructure for these partner groups is generally free-to-use and rudimentary in nature, meaning that damage would be contained and more easily reversed through simple fixes like back-ups. Finally, from the perspective of the Park Partnership Initiative, this would not result in a dramatic shift in practice, as partner organizations are already being used by natural resource management teams as a work around for restrictive IT policies. Currently, if partner groups are using a program, Natural Resource Management Team members can claim that their use of that program is not in

contravention of Metro Vancouver IT policies, as part of their job is to assist partner organizations in their programming efforts. If partner programming necessitates the use of a specific program, then regardless of how Metro Vancouver staff manage to access that technology, they are simply doing their job. Under an Agile IT approach, these semantics would not be needed, as the use of this technology could be reported to central IT as a management experiment. Overall, this would be a healthy change in the relationship between these departments.

Still, this cultural shift in IT management is not going to happen overnight, though given the dissatisfaction of Metro Vancouver staff with current regulatory structures I do expect that a change will occur sooner, rather than later. Practically speaking, a shift to Agile IT requires restructuring both within the pre-existing IT environment, and across Metro Vancouver's other departments. Positions may be made redundant, complex regulatory structures will need to be realigned to meet the more flexible nature of Agile IT, and hierarchical approaches to decision making and problem solving will have to lessen. The organizational stress that this sort of change creates is great, and there will be substantial pushback by administrators and others who view the re-alignment of authority and power within Agile IT management as a threat to their role (Lee, 1993). For these many reasons, such practices must be implemented slowly. The Park Partnership Initiative provides a great deal of opportunities for pilot projects to see how a more flexible IT management system might impact technology adoption within an adaptive co-management framework. Moving forward, I would recommend that those thinking of making this move, conduct a number of stress tests, to see where change can be implemented with the least amount of disruption.

- v. *The role of park associations as bridging organizations should be formalized as spaces for mediation and conflict resolution, and they should represent a diverse population of park stakeholders.*

One of the original goals of the Park Partnership Initiative was to have park associations serve a bridging function. That is, these societies were meant to represent a range of regional park users and stakeholders, allowing for broader participation and engagement with Metro

Vancouver through a single organization. Bridging organizations are integral to land management institutions as they attempt to navigate the extremely complex stakeholder networks that operate within regional parks (Westley & Vredenburg, 1991). They add value to these networks by providing linkages for collaboration and participation, both vertically and horizontally; but most importantly, they provide spaces for interorganizational learning, trust building, and conflict resolution (Crona & Parker, 2012; Westley & Vredenburg, 1991). Unfortunately, within Metro Vancouver Regional Parks this function as a bridging organization is only informally appreciated. This relationship needs to be formalized, and park association boards should take steps to represent a broader diversity of institutions and actors.

Metro Vancouver should formalize these spaces as sites for conflict resolution, actively calling upon park associations to act as moderators. This is particularly true when conflicts exist between Metro Vancouver and other stakeholders, and a power imbalance may result in issues like a lack of transparency or conflicts of interest. By empowering park associations in this manner, Metro Vancouver would signal to stakeholders that these partner organizations are a power neutral forum within which they can negotiate in good faith. While this may not be possible regarding matters specific to environmental concerns, for regulatory reasons I discussed in Chapter 3, park associations could certainly become spaces to help resolve social conflict and to promote collaborative approaches to overcoming disagreements on issues like by-law enforcement. I believe that healthier relationships will lead to healthier stakeholder engagement on other topics, such as ecological restoration.

In order for park associations to formally take on this role though, the neutrality of these organizations must be improved by increasing stakeholder representation at the board level where decision-making occurs. Currently, park association boards consist of those who have the resources and time to take on such a position. Generally, this has resulted in boards that are primarily white, socioeconomically advantaged, able-bodied, and retired. Further, there are multiple organizations in this study where the same board members have served for decades, only taking a one-year period of leave as society by-laws dictate. The result has been that a majority of these boards have become entrenched, and this is not healthy in terms of either institutional or actor-level diversity.

Institutionally, board representation could be improved by seeking out a representative from other stakeholder organizations to sit in at monthly meetings or join the board of directors; though, this latter option may become unwieldy given the sheer number of stakeholder groups within the regional park system. Where this is not possible, park association representatives could attend monthly meetings of other stakeholder groups and then report back. As president of the Pacific Spirit Park Society, I found that attending the monthly meetings of other stakeholder groups greatly increased relationships and strengthened ties. This social capital is not only useful when trying to moderate discussions or disputes between stakeholders, but when lobbying for programming initiatives.

In terms of actor-level diversity, increasing partnerships with other community-based organizations, such as: cultural centers, religious groups, and after-school programs may result in greater overall diversity. Political movements, such as anti-racism groups, pride groups, etc. can also be supported through allyship and made official partners. Not only can these organizations help to highlight access barriers that various minority groups are facing, but as volunteer numbers grow, the actor-level diversity of boards may grow as well. As discussed in Chapter 5 though, the issue of tokenism was an issue for some persons of color in this study. Though these feelings were not brought up by mobility challenged members, or those of low socioeconomic status, I would highlight this as a potential barrier in these cases as well. A person should not be required to act as a mouthpiece for their race, culture, class, age-bracket, or level of ability. Rather, a supportive culture must be cultivated, in which boards stand behind and empower these individuals if they choose to speak on such matters.

6.2 Strengths and Limitations of Research

Reflecting on the methods and contributions related to this research, there are – of course - strengths and weaknesses to discuss. This thesis was not meant to be a survey or conclusive list of barriers and obstacles facing community partners engaging in adaptive co-management. Nor, was it meant to provide a guide to the implementation of this management framework. Rather, my research is grounded in the lived experiences of stakeholders and professionals, as they enact adaptive co-management within regional parks. In particular, I have sought to provide a bottom-up assessment of barriers related to citizen monitoring, bureaucracy, and stakeholder

engagement, while also providing best practices that may prove useful to both my participants and other regional park systems. To my knowledge, there has not been a great deal of work combining discussions on citizen monitoring, stakeholder engagement, and institutional theory within an adaptive co-management context, and certainly not from the position of community partners. Typically, research has focused on case-studies of the wide range of common-pool resources that might benefit from this form of management, or top-down empirical work that seeks to build sustainable systems (Carlsson & Berkes, 2005). In terms of a contribution to this field, I hope that this work can stand out as an example of how ethnography can be utilized to give a voice to community members and volunteers within adaptive co-management environments. These communities have lessons and stories to share, and it is to our advantage to listen.

Related to my choice to ground this thesis in the experiences and stories of community members, my findings are more relevant to adaptive co-management as it is understood from individual, organizational, and regional perspectives. My findings cannot be easily generalized beyond that scale. However, due to the breadth of these personal experiences I was able to link my findings to wider debates or discussions in the literature. In doing so, I provided specific examples to help ground broader theoretical assertions in reality.

Regarding the overall structure of this thesis, this breadth was both a limitation and a strength. As should be apparent by now, adaptive co-management has three primary components to it: environmental management, stakeholder engagement, and the institutions/organizations involved in these processes (Berkes et al., 2007). While exploring barriers to the implementation of adaptive co-management, I thought that it was appropriate to explore all three of these components, because the degree to which each of these was connected to obstacles varied substantially between the organizations that I was working with. However, this choice also resulted in a broad array of topics that can be difficult to integrate: funding policies, data assessment, communication policies, technology adoption, stakeholder marginalization, and lack of representation. The price of integration in this case was the specificity of my conclusions in some cases. At the same time, without this integration, an incomplete picture of the participatory nature of adaptive co-management would have been the result. I tried to strike a balance regarding this dilemma and hope to have found an acceptable compromise.

Other limitations emerged from my methodology, specifically issues related to the use of self-reported data, or information that was gained through interviews, participant observation, and my own recollection. There are several possible issues with such data. Selective memory on behalf of participants, and myself, might have resulted in an overemphasis on a particular problem or issue. Additionally, telescoping could have resulted in the order of past events being misremembered. Finally, some participants were prone to exaggeration and this could have resulted in an overemphasis of particular events in my research. Entering into this research, I was cognizant of these sorts of limitations regarding ethnographic findings, and this is why I attempted to verify the veracity of those statements that I included in this thesis by cross-checking information with other participants, organizational records, and my own field notes. This method, known as triangulation, decreases the impact of these methodological issues on my overall thesis, and increases the trustworthiness of my data (Marshall & Rossman, 2016).

Connected to the use of interview data, was the unequal sample sizes for each organization involved in this study. In response to this, I attempted to shore up organizations that were lacking formal interviews with informal interviews conducted in the field. However, those informal interviews and my field notes did not undergo the same form of iterative coding that formal interviews did. For those conducting similar research in the future, if time is available, I would recommend that they code informal interviews as well as field notes in order to ensure a more cohesive reporting structure for findings. Simply, time was a factor for this thesis, and I did not have enough to expand my interviews to thirty-six. Indeed, if I had another year, I would like to have expanded my interviews to forty-five and delineated Metro Vancouver interviews by West and Central Area Offices. With so many of these barriers being felt unequally at the regional scale, this may have helped me to find additional reasons for this difference.

Finally, I would like to speak to the use of my personal experience in this thesis. As someone who has been a community member involved in the Park Partner Initiative for the last four years, I used my experiences throughout this research as a way to connect with participants, and to help navigate complex stakeholder networks with which I had a history. My previous experience with Metro Vancouver Regional Parks also helped to guide my interview questions and added nuance to my analysis. Still, throughout this research, I was also cognizant of the threat of personal bias that can come with this sort of prior experience. To reduce the impact of

such bias, I consistently sought out information that would provide contrary accounts to my own, or that challenged both my own experiences and the literature. For example, my initial reading of the Wreck Beach Preservation Society's dispute with Metro Vancouver was that this was primarily due to interpersonal conflict. Upon closer inspection, I was surprised to discover how this issue intersected with marginalization within the wider beach-user community. As a lesson for those engaging in ethnographic research as an insider, know that although personal experience provides many benefits, overcoming one's prior beliefs, assertions, and the actions attributed to them, is more difficult than it sounds. Always be vigilant of this.

6.3 Future Directions and a Final Word

As it stands, adaptive co-management is an iterative process, and the Park Partnership Initiative is yet another management experiment, the goal of which is to reduce the complexity of social-ecological systems. This thesis is just one of the latest phases of this experiment - a chance to explore, improve, and re-imagine something that is not broken, but can be made better. By confronting barriers to participation in adaptive co-management, the complex networks of people, nature, and institutions that comprise regional parks will be transformed for the better.

Multiple ethnographic case-studies require a great deal of community support to be successful. While the time I have spent researching and writing this thesis is great, this does not compare to the countless hours that community members and Metro Vancouver Professionals have given. In such cases, reciprocation is not only advisable, but an ethical imperative in so far as one values the health of the relationships that they are studying. Moving forward, the most immediate use of this research will be to provide a white paper to Metro Vancouver and those partner organizations that have taken part in this study. Then, the difficult work of addressing the many barriers introduced in this thesis can begin.

Academically, the intersection of citizen science, institutional theory, and stakeholder engagement has raised troubling insights when viewed within the context of adaptive co-management. While land management institutions are beginning to consistently call on citizen science as a resource to meet labor shortages and needs for increased community engagement, the bureaucratic structures and procedures of these same institutions are working against their own goals. Additionally, the rigid procedures and structures inherent to institutional culture, are

damaging more traditional methods of participation in adaptive co-management, and exacerbating issues like: stakeholder marginalization, communication barriers, and a slow adoption of technology that could further engagement. Future research that looks at other regional stakeholder networks using a similar methodological approach to this one, would set the stage for a broader generalization of the findings in this thesis. Additionally, overcoming the shortcomings of this research, particularly where sample size and lack of attention to regional divisions were a concern, may result in novel findings regarding the implementation of adaptive co-management.

As a final word, I would like to draw attention towards the intersections of citizen monitoring, institutional culture, and stakeholder engagement that this thesis has helped to illuminate. None of the barriers discussed in this study can be understood on their own, nor should any solutions be implemented without respecting how they will impact the broader adaptive co-management system. The best practices that I have outlined in this conclusion should therefore be considered holistically, and if integrated into actual park management, operationalized in a similar manner. This will not be easy, parkland is an incredibly complex space – a mosaic of social and natural systems. Luckily, this is just the sort of environment that adaptive co-management is meant to address.

References

- Aceves-Bueno, E., Adeleye, A. S., Bradley, D., Tyler Brandt, W., Callery, P., Feraud, M., ... Tague, C. (2015b). Citizen Science as an Approach for Overcoming Insufficient Monitoring and Inadequate Stakeholder Buy-in in Adaptive Management: Criteria and Evidence. *Ecosystems*, 18(3), 493–506.
- Agee, J. (2009). Developing qualitative research questions: A reflective process. *International Journal of Qualitative Studies in Education*, 22(4), 431–447.
- Allen, C. R., & Garmestani, A. S. (Eds.). (2015). *Adaptive Management of Social-Ecological Systems*. Dordrecht: Springer Netherlands.
- Allen, C. R., & Gunderson, L. H. (2011). Pathology and failure in the design and implementation of adaptive management. *Journal of Environmental Management*, 92(5), 1379–1384.
- Ambus, L., & Hoberg, G. (2011). The Evolution of Devolution: A Critical Analysis of the Community Forest Agreement in British Columbia. *Society & Natural Resources*, 24(9), 933–950.
- Antelio, M., Esteves, M. G. P., Schneider, D., & Souza, J. M. de. (2012). Qualitocracy: A data quality collaborative framework applied to citizen science. *2012 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 931–936.
- Baird, J., Plummer, R., Schultz, L., Armitage, D., & Bodin, Ö. (2019). How Does Socio-institutional Diversity Affect Collaborative Governance of Social–Ecological Systems in Practice? *Environmental Management*, 63(2), 200–214.
- Batini, C., & Scannapieca, M. (2006). *Data quality: Concepts, methodologies and techniques*. Berlin; New York: Springer.
- Berkes, F. (1989). *Common Property Resources: Ecology and Community-based Sustainable Development*. New York; London: Belhaven Press.
- Berkes, F. (2009). Evolution of co-management: Role of knowledge generation, bridging organizations and social learning. *Journal of Environmental Management*, 90(5), 1692–1702.
- Berkes, F. (2010). Devolution of environment and resources governance: Trends and future. *Environmental Conservation*, 37(04), 489–500.

- Berkes, F., Armitage, D. R., & Doubleday, N. (2007). *Adaptive co-management: collaboration, learning, and multi-level governance*. Vancouver: UBC Press.
- Berkes, F., Colding, J., & Folke, C. (2003). *Navigating social-ecological systems: building resilience for complexity and change*. New York: Cambridge University Press.
- Bird, T. J., Bates, A. E., Lefcheck, J. S., Hill, N. A., Thomson, R. J., Edgar, G. J., ... Frusher, S. (2014). Statistical solutions for error and bias in global citizen science datasets. *Biological Conservation*, *173*, 144–154.
- Bocking, S. (2004). *Nature's Experts: Science, Politics and the Environment*. New Brunswick; New Jersey: Rutgers University Press.
- Bondy, K., & Charles, A. (2018). Mitigating Stakeholder Marginalisation with the Relational Self. *Journal of Business Ethics*, 1-16.
- Bonney, R. (1996). Citizen science: a lab tradition. *Living Bird*, *15*(4), 7–15.
- Boritz, J. E., Hayes, L., & Lim, J.-H. (2013). A content analysis of auditors' reports on IT internal control weaknesses: The comparative advantages of an automated approach to control weakness identification. *International Journal of Accounting Information Systems*, *14*(2), 138–163.
- Brown, L. D. (1991). Bridging Organizations and Sustainable Development. *Human Relations*, *44*(8), 807–831.
- Brown, L. D. (1993). Development Bridging Organizations and Strategic Management for Social Change. *Institute for Development Research Reports*, *10*(3), 1–26.
- Burgess, H. K., DeBey, L. B., Froehlich, H. E., Schmidt, N., Theobald, E. J., Ettinger, A. K., ... Parrish, J. K. (2017). The science of citizen science: Exploring barriers to use as a primary research tool. *Biological Conservation*, *208*, 113–120.
- Burnaby Lake Park Association. (1995). *The Group of Ten* (pp. 1–20). Burnaby, CA.
- Carlsson, L., & Berkes, F. (2005). Co-management: Concepts and methodological implications. *Journal of Environmental Management*, *75*(1), 65–76.
- Caves, J. K., Bodner, G. S., Simms, K., Fisher, L. A., & Robertson, T. (2013). Integrating Collaboration, Adaptive Management, and Scenario-Planning: Experiences at Las Cienegas National Conservation Area. *Ecology and Society*, *18*(3), 1-19.

- Ceccaroni, L., & Piera, J. (2017). *Analyzing the role of citizen science in modern research* (1st ed.). Hershey, PA: Information Science Reference.
- Cinner, J. E., Daw, T. M., McClanahan, T. R., Muthiga, N., Abunge, C., Hamed, S., ... Jiddawi, N. (2012). Transitions toward co-management: The process of marine resource management devolution in three east African countries. *Global Environmental Change*, 22(3), 651–658.
- Conrad, C. C., & Hilchey, K. G. (2011). A review of citizen science and community-based environmental monitoring: Issues and opportunities. *Environmental Monitoring and Assessment*, 176(1–4), 273–291.
- Costanza, R. (2001). *Institutions, ecosystems, and sustainability*. Boca Raton: Lewis Publishers.
- Cox, M. (2016). The pathology of command and control: a formal synthesis. *Ecology and Society*, 21(3), 1-8.
- Crall, A. W., Newman, G. J., Stohlgren, T. J., Holfelder, K. A., Graham, J., & Waller, D. M. (2011). Assessing citizen science data quality: An invasive species case study. *Conservation Letters*, 4(6), 433–442.
- Crona, B. I., & Parker, J. N. (2012). Learning in Support of Governance: Theories, Methods, and a Framework to Assess How Bridging Organizations Contribute to Adaptive Resource Governance. *Ecology and Society*, 17(1), 1-18.
- Cronkleton, P., Saigal, S., & Pulhin, J. (2012). Co-management in community forestry: How the partial devolution of management rights creates challenges for forest communities. *Conservation and Society*, 10(2), 1-13.
- d'Armengol, L., Prieto Castillo, M., Ruiz-Mallén, I., & Corbera, E. (2018). A systematic review of co-managed small-scale fisheries: Social diversity and adaptive management improve outcomes. *Global Environmental Change*, 52, 212–225.
- Danielsen, F., Burgess, N. D., & Balmford, A. (2005). Monitoring Matters: Examining the Potential of Locally-based Approaches. *Biodiversity and Conservation*, 14(11), 2507–2542.
- Danter, J., Griest, D., Mullins, G., & Norland, E. (2000). Organizational Change as a Component of Ecosystem Management. *Society & Natural Resources*, 13(6), 537–547.

- Delaney, D. G., Sperling, C. D., Adams, C. S., & Leung, B. (2008). Marine invasive species: Validation of citizen science and implications for national monitoring networks. *Biological Invasions*, *10*(1), 117–128.
- DeWalt, K. M., & DeWalt, B. R. (2011). *Participant observation: a guide for fieldworkers* (2nd ed.). Lanham, MD: Altamira Press
- Dickinson, J. L., & Bonney, R. (2012). *Citizen science: public participation in environmental research*. Ithaca: Comstock Pub. Associates.
- Dickinson, J. L., Zuckerberg, B., & Bonter, D. N. (2010). Citizen Science as an Ecological Research Tool: Challenges and Benefits. *Annual Review of Ecology, Evolution, and Systematics*, *41*(1), 149–172.
- Dunning, K. H. (2017). Missing the trees for the forest? Bottom-up policy implementation and adaptive management in the US natural resource bureaucracy. *Journal of Environmental Planning and Management*, *60*(6), 1036–1055.
- Dybå, T., & Dingsøy, T. (2008). Empirical studies of agile software development: A systematic review. *Information and Software Technology*, *50*(9–10), 833–859.
- Eagland, N. (2016, June 5). Naturists bare all after being stripped of Wreck Beach bus stop. *Vancouver Sun*.
- Edgar, G., & Stuart-Smith, R. (2009). Ecological effects of marine protected areas on rocky reef communities—a continental-scale analysis. *Marine Ecology Progress Series*, *388*, 51–62.
- Fernandez-Gimenez, M. E., Ballard, H. L., & Sturtevant, V. E. (2008). Adaptive Management and Social Learning in Collaborative and Community-Based Monitoring: a Study of Five Community-Based Forestry Organizations in the western USA. *Ecology and Society*, *13*(2), 4-26.
- Finkbeiner, E. M., & Basurto, X. (2015). Re-defining co-management to facilitate small-scale fisheries reform: An illustration from northwest Mexico. *Marine Policy*, *51*, 433–441.
- Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive Governance of Social-Ecological Systems. *Annual Review of Environment and Resources*, *30*(1), 441–473.
- Folke, C., Pritchard Jr, L., Berkes, F., Colding, J., & Svedin, U. (2007). The problem of fit between ecosystems and institutions: Ten years later. *Ecology and Society*, *12*(1).

- Foody, G., See, L., International Institute for Applied Systems Analysis (IIASA), AT, Fritz, S., Mooney, P., Olteanu-Raimond, A.-M., ... Antoniou, V. (2017). *Mapping and the Citizen Sensor*.
- Forgione, H. M., Pregitzer, C. C., Charlop-Powers, S., & Gunther, B. (2016). Advancing urban ecosystem governance in New York City: Shifting towards a unified perspective for conservation management. *Environmental Science & Policy*, 62, 127–132.
- Forsten-Astikainen, R., Hurmelinna-Laukkanen, P., Lämsä, T., Heilmann, P., & Hyrkäs, E. (2017). Dealing with organizational silos with communities of practice and human resource management. *Journal of Workplace Learning*, 29(6), 473–489.
- Freeman, R. E. (1984). *Strategic management: a stakeholder approach*. Boston: Pitman.
- Fuccillo, K. K., Crimmins, T. M., de Rivera, C. E., & Elder, T. S. (2015). Assessing accuracy in citizen science-based plant phenology monitoring. *International Journal of Biometeorology*, 59(7), 917–926.
- Gallay, E., Marckini-Polk, L., Schroeder, B., & Flanagan, C. (2016). Place-Based Stewardship Education: Nurturing Aspirations to Protect the Rural Commons. *Peabody Journal of Education*, 91(2), 155–175.
- Galletta, A. (2013). *Mastering the semi-structured interview and beyond: from research design to analysis and publication*. New York: New York University Press.
- Galloway, A. W., Tudor, M. T., & Haegan, W. M. (2006). The reliability of citizen science: A case study of Oregon white oak stand surveys. *Wildlife Society Bulletin*, 34(5), 1425–1429.
- Geertz, C. (1973). Thick Description: Toward an Interpretive Theory of Culture. In *The Cultural Geography Reader* (pp. 41–51). New York: Routledge.
- Gobster, P. H., & Barro, S. C. (2000). Negotiating nature: Making restoration happen in an urban park context. In *Restoring Nature: Perspectives from the Social Sciences and Humanities* (pp. 185–207). Washington, D.C: Island Press.
- Gray, B. (1989). *Collaborating: Finding common ground for multiparty problems*. San Francisco: Jossey-Bass.
- Gregory, R., Ohlson, D., & Arvai, J. (2006). Deconstructing adaptive management: Criteria for applications to environmental management. *Ecological Applications*, 16(6), 2411–2425.

- Gunderson, L. (1999). Resilience, Flexibility and Adaptive Management – – Antidotes for Spurious Certitude? *Conservation Ecology*, 3(1), 1-7.
- Gunderson, L. H., Holling, C. S., & Light, S. S. (1995). *Barriers and bridges to the renewal of ecosystems and institutions*. New York: Columbia University Press.
- Habermas, J. (1987). *The philosophical discourse of modernity: twelve lectures*. Cambridge, MA: MIT Press.
- Hamilton, R. J., Giningele, M., Aswani, S., & Ecochard, J. L. (2012). Fishing in the dark-local knowledge, night spearfishing and spawning aggregations in the Western Solomon Islands. *Biological Conservation*, 145(1), 246–257.
- Harris, G. P. (2007). *Seeking sustainability in an age of complexity*. Cambridge: Cambridge University Press.
- Harrison, A. K. (2018). *Ethnography*. New York: Oxford University Press.
- Hassett, J., & Burke, E. (2017). Project Management: Why the Agile Approach Is So Important to Law Firms. *Of Counsel*, 36(10), 6–9.
- Heslop, C., Burns, S., & Lobo, R. (2018). Managing qualitative research as insider-research in small rural communities. *Rural and Remote Health*.
- Holck, M. H. (2008). Participatory forest monitoring: An assessment of the accuracy of simple cost-effective methods. *Biodiversity and Conservation*, 17(8), 2023–2036.
- Holling, C. S. (1978). *Adaptive environmental assessment and management*. [Laxenburg, Austria] : Chichester; New York: International Institute for Applied Systems Analysis; Wiley.
- Holling, Crawford S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4(1), 1–23.
- Holling, & Meffe. (1996). Command and Control and the Pathology of Natural Resource Management. *Conservation Biology*, 10(2), 328–337.
- Hunter, J., Alabri, A., & van Ingen, C. (2013). Assessing the quality and trustworthiness of citizen science data. *Concurrency and Computation: Practice and Experience*, 25(4), 454–466.
- Imperial, M. (2001). *Collaboration as an implementation strategy: An assessment of six watershed management programs*. Indiana University, Bloomington, IN.

- Irwin, A. (1995). *Citizen science: a study of people, expertise, and sustainable development*. New York; London: Routledge.
- Kallis, G., Kiparsky, M., & Norgaard, R. (2009). Collaborative governance and adaptive management: Lessons from California's CALFED Water Program. *Environmental Science & Policy*, *12*(6), 631–643.
- Keith, D. A., Martin, T. G., McDonald-Madden, E., & Walters, C. (2011). Uncertainty and adaptive management for biodiversity conservation. *Biological Conservation*, *144*(4), 1175–1178.
- Knapp, C. N., Chapin III, F. S., Kofinas, G. P., Fresco, N., Carothers, C., & Craver, A. (2014). Parks, people, and change: The importance of multistakeholder engagement in adaptation planning for conserved areas. *Ecology and Society*, *19*(4), 16-31.
- Koontz, T. M., & Johnson, E. M. (2004). One size does not fit all: Matching breadth of stakeholder participation to watershed group accomplishments. *Policy Sciences*, *37*(2), 185–204.
- Kosmala, M., Wiggins, A., Swanson, A., & Simmons, B. (2016). Assessing data quality in citizen science. *Frontiers in Ecology and the Environment*, *14*(10), 551–560.
- Kountoupes, D. L., & Oberhauser, K. S. (2008). Citizen science and youth audiences: educational outcomes of the Monarch Larva Monitoring Project: engaging youth in citizen science fulfills several objectives and enables youth to conduct “real” science in community settings. Adult volunteers play key roles and also benefit. *Journal of Community Engagement and Scholarship*, *1*(1), 10-20.
- Kusters, K., Buck, L., de Graaf, M., Minang, P., van Oosten, C., & Zagt, R. (2018). Participatory Planning, Monitoring and Evaluation of Multi-Stakeholder Platforms in Integrated Landscape Initiatives. *Environmental Management*, *62*(1), 170–181.
- Lappi, T., Karvonen, T., Lwakatare, L. E., Aaltonen, K., & Kuvaja, P. (2018). Toward an Improved Understanding of Agile Project Governance: A Systematic Literature Review. *Project Management Journal*, *49*(6), 39–63.
- Lave, R. (2012). Neoliberalism and the Production of Environmental Knowledge. *Environment and Society*, *3*(1).

- Lawrence, T. B. (2002). Institutional Effects of Interorganizational Collaboration: The Emergence of Proto-Institutions. *The Academy of Management Journal*, 45(1), 281–290.
- Lebel, L., Anderies, J. M., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T. P., & Wilson, J. (2006). Governance and the Capacity to Manage Resilience in Regional Social-Ecological Systems. *Ecology and Society*, 11(1), 1-21.
- Lee, K. N. (1993). *Compass and gyroscope: integrating science and politics for the environment*. Washington, D.C.: Island Press.
- Lee, K. N. (1995). Deliberately seeking sustainability in the Columbia River basin. In *Barriers and bridges to the renewal of ecosystems and institutions* (pp. 214–238). New York: Columbia University Press.
- Levrel, H., Fontaine, B., Henry, P.-Y., Jiguet, F., Julliard, R., Kerbiriou, C., & Couvet, D. (2010). Balancing state and volunteer investment in biodiversity monitoring for the implementation of CBD indicators: A French example. *Ecological Economics*, 69(7), 1580–1586.
- Lockwood, M., Davidson, J., Curtis, A., Stratford, E., & Griffith, R. (2009). Multi-level Environmental Governance: Lessons from Australian natural resource management. *Australian Geographer*, 40(2), 169–186.
- Low, S. M., Taplin, D., & Scheld, S. (2005). *Rethinking Urban Parks: Public Space and Cultural Diversity*. Austin: University of Texas Press.
- Maggs-Rapport, F. (2001). 'Best research practice': in pursuit of methodological rigour. *Journal of Advanced Nursing*, 35(3), 373–383.
- Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (Sixth edition). Los Angeles, CA: SAGE.
- McCay, B. J., & Acheson, J. M. (1987). *The Question of the commons: the culture and ecology of communal resources*. Tucson: University of Arizona Press.
- McDonough MacKenzie, C., Murray, G., Primack, R., & Weihrauch, D. (2017). Lessons from citizen science: Assessing volunteer-collected plant phenology data with Mountain Watch. *Biological Conservation*, 208, 121–126.

- Méndez, P. F., Isendahl, N., Amezaga, J. M., & Santamaría, L. (2012). Facilitating Transitional Processes in Rigid Institutional Regimes for Water Management and Wetland Conservation: Experience from the Guadalquivir Estuary. *Ecology and Society*, 17(1).
- Metro Vancouver. (2011). *Metro Vancouver 2040: Regional Growth Strategy*. Vancouver.
- Metro Vancouver. (2016). *Metro Vancouver: Regional Parks Plan 2016*. Vancouver.
- Metro Vancouver. (2017). *Visits, Visitor Services & Volunteering by the Numbers – 2017*. Vancouver.
- Ming'ate, F. L. M. (2014). Combining Ethnography and Case Study Research Designs In Studying Forestry Co-Management Approaches. *Journal of Human and Social Science Research*, 3(2), 67–79.
- Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *The Academy of Management Review*, 22(4), 853.
- Murray, G., Agyare, A., Dearden, P., & Rollins, R. (2018). Devolution, coordination, and community-based natural resource management in Ghana's community resource management areas. *African Geographical Review*, 1–14.
- Newman, G., Wiggins, A., Crall, A., Graham, E., Newman, S., & Crowston, K. (2012). The future of citizen science: Emerging technologies and shifting paradigms. *Frontiers in Ecology and the Environment*, 10(6), 298–304.
- Ostrom, E. (1990). *Governing the commons: the evolution of institutions for collective action*. Cambridge; New York: Cambridge University Press.
- Ostrom, E. (2005). *Understanding institutional diversity*. Princeton, NJ: Princeton University Press.
- Pandya, R. E. (2012). A framework for engaging diverse communities in citizen science in the US. *Frontiers in Ecology and the Environment*, 10(6), 314–317.
- Pawlick, M. (1999). *Disability, park access and quality of life: An examination of recreational equity*. University of Western Ontario, Ontario, CA.
- Pigozzi, M. J. (2010). Implementing the UN Decade of Education for Sustainable Development (DESD): Achievements, open questions and strategies for the way forward. *International Review of Education*, 56(2–3), 255–269.

- Pipino, L. L., Lee, Y. W., & Wang, R. Y. (2002). Data quality assessment. *Communications of the ACM*, 45(4), 211–218.
- Plummer, R., Crona, B., Armitage, D. R., Olsson, P., Tengö, M., & Yudina, O. (2012). Adaptive Comanagement: A Systematic Review and Analysis. *Ecology and Society*, 17(3).
- Prell, C., Hubacek, K., & Reed, M. (2009). Stakeholder Analysis and Social Network Analysis in Natural Resource Management. *Society & Natural Resources*, 22(6), 501–518.
- Raptis, M., & Cooper, S. (2015, May 12). Social media vigilante exposes unwanted Wreck Beach photographers. *The Province*.
- Reed, J. A., Price, A. E., Grost, L., & Mantinan, K. (2012). Demographic Characteristics and Physical Activity Behaviors in Sixteen Michigan Parks. *Journal of Community Health*, 37(2), 507–512.
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431.
- Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., ... Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90(5), 1933–1949.
- Ribot, J. C., Agrawal, A., & Larson, A. M. (2006). Recentralizing While Decentralizing: How National Governments Reappropriate Forest Resources. *World Development*, 34(11), 1864–1886.
- Riesch, H., & Potter, C. (2014). Citizen science as seen by scientists: Methodological, epistemological and ethical dimensions. *Public Understanding of Science*, 23(1), 107–120.
- Robson, C. (2002). *Real world research: a resource for social scientists and practitioner-researchers* (2nd ed.). Oxford, UK: Blackwell Publishers.
- Roman, L. A., Scharenbroch, B. C., Östberg, J. P. A., Mueller, L. S., Henning, J. G., Koeser, A. K., ... Jordan, R. C. (2017). Data quality in citizen science urban tree inventories. *Urban Forestry & Urban Greening*, 22, 124–135.
- Sanginga, P. C., Kamugisha, R. N., & Martin, A. M. (2010). Strengthening Social Capital for Adaptive Governance of Natural Resources: A Participatory Learning and Action Research for Bylaws Reforms in Uganda. *Society & Natural Resources*, 23(8), 695–710.

- Savage, G. T., Bunn, M. D., Gray, B., Xiao, Q., Wang, S., Wilson, E. J., & Williams, E. S. (2010). Stakeholder Collaboration: Implications for Stakeholder Theory and Practice. *Journal of Business Ethics*, 96(S1), 21–26.
- Schultz, L., Folke, C., Österblom, H., & Olsson, P. (2015). Adaptive governance, ecosystem management, and natural capital. *Proceedings of the National Academy of Sciences*, 112(24), 7369–7374.
- Sheppard, S. A., & Terveen, L. (2011). Quality is a verb: The operationalization of data quality in a citizen science community. *Proceedings of the 7th International Symposium on Wikis and Open Collaboration*, 29–38.
- Shilling, F. M., London, J. K., & Liévanos, R. S. (2009). Marginalization by collaboration: Environmental justice as a third party in and beyond CALFED. *Environmental Science & Policy*, 12(6), 694–709.
- Singleton, S. (1998). *Constructing cooperation: the evolution of institutions of comanagement*. Ann Arbor: University of Michigan Press.
- Sousa, M. F. (2013). Management and Leadership: An Agile Approach to New Nurse Orientation: How One Hospital Created a Sustainable Orientation Plan for Newly Hired Radiology Nurses. *Journal of Radiology Nursing*, 32(1), 45–47.
- Spradley, J. P. (1980). *Participant observation*. New York: Holt, Rinehart and Winston.
- Spradley, J. P., & McCurdy, D. W. (1972). *The cultural experience: ethnography in complex society*. Chicago: Science Research Associates.
- Stankey, G. H., Clark, R. N., & Bormann, B. T. (2005). *Adaptive management of natural resources: Theory, concepts, and management institutions*. USA: USDA.
- Starr, J., Schweik, C. M., Bush, N., Fletcher, L., Finn, J., Fish, J., & Barger, C. T. (2014). Lights, Camera...Citizen Science: Assessing the Effectiveness of Smartphone-Based Video Training in Invasive Plant Identification. *PLoS ONE*, 9(11), 2-8.
- Stern, P. N., & Porr, C. (2011). *Essentials of accessible grounded theory* (Vol. 4). Walnut Creek, CA: Left Coast Press.
- Stevenson, R. B. (2007). Schooling and environmental education: Contradictions in purpose and practice. *Environmental Education Research*, 13(2), 139–153.

- Stewart, J., & Tyler, M. E. (2019). Bridging organizations and strategic bridging functions in environmental governance and management. *International Journal of Water Resources Development*, 35(1), 71–94.
- Sukop, M. C., & Lanier, A. L. (2016). Interdisciplinary Projects Require an Adaptive and Agile Management Approach: South Florida Water, Sustainability, and Climate Project Experience. In *World Environmental and Water Resources Congress 2016* (Vols. 1–Book, Section, pp. 184–189).
- Swyngedouw, E. (2005). Governance innovation and the citizen: The Janus face of governance-beyond-the-state. *Urban Studies*, 42(11), 1991–2006.
- Takeda, L., & Røpke, I. (2010). Power and contestation in collaborative ecosystem-based management: The case of Haida Gwaii. *Ecological Economics*, 70(2), 178–188.
- Talley, J. L., Schneider, J., & Lindquist, E. (2016). A simplified approach to stakeholder engagement in natural resource management: The Five-Feature Framework. *Ecology and Society*, 21(4), 1-10.
- Taylor, J. (2011). The intimate insider: negotiating the ethics of friendship when doing insider research. *Qualitative Research*, 11(1), 3–22.
- Theobald, E. J., Ettinger, A. K., Burgess, H. K., DeBey, L. B., Schmidt, N. R., Froehlich, H. E., ... Parrish, J. K. (2015). Global change and local solutions: Tapping the unrealized potential of citizen science for biodiversity research. *Biological Conservation*, 181, 236–244.
- United Nations. (2018). *World Urbanization Prospects 2018*. New York: United Nations.
- Vahidi, H., Klinkenberg, B., & Yan, W. (2018). Trust as a proxy indicator for intrinsic quality of Volunteered Geographic Information in biodiversity monitoring programs. *GIScience & Remote Sensing*, 55(4), 502–538.
- Walters, C. J. (1986). *Adaptive management of renewable resources*. New York: Collier Macmillan.
- Walters, C. J., & Holling, C. S. (1990). Large-Scale Management Experiments and Learning by Doing. *Ecology*, 71(6), 2060–2068.
- Wand, Y., & Wang, R. (1996). Anchoring data quality dimensions in ontological foundations. *Communications of the ACM*, 39(11), 86–95.

- Wang, R. Y., & Strong, D. M. (1996). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, 12(4), 5-34.
- Weisinger, J. Y., Borges-Méndez, R., & Milofsky, C. (2016). Diversity in the Nonprofit and Voluntary Sector. *Nonprofit and Voluntary Sector Quarterly*, 45(1_suppl), 3S-27S.
- Westgate, M. J., Likens, G. E., & Lindenmayer, D. B. (2013). Adaptive management of biological systems: A review. *Biological Conservation*, 158, 128–139.
- Westley, F., & Vredenburg, H. (1991). Strategic Bridging: The Collaboration between Environmentalists and Business in the Marketing of Green Products. *The Journal of Applied Behavioral Science*, 27(1), 65–90.
- Wiggins, A. (2013). Free as in puppies: Compensating for ICT constraints in citizen science. *Proceedings of the 2013 Conference on Computer Supported Cooperative Work*, 1469–1480.
- Williams, B. K. (2011). Adaptive management of natural resources—framework and issues. *Journal of Environmental Management*, 92(5), 1346–1353.
- Wondolleck, J. M., & Yaffee, S. L. (2000). *Making collaboration work: lessons from innovation in natural resource management*. Washington, D.C.: Island Press.
- Woolley, P. (2008, July 30). Wreck Beach under siege. *The Georgia Straight*.
- World Commission on Environment and Development. (1987). *Our Common Future*. New York, NY: Oxford University Press.
- Young, O. R. (2002b). *The institutional dimensions of environmental change: fit, interplay, and scale*. Cambridge, MA: MIT Press.
- Zimmermann, S., Rentrop, C., & Felden, C. (2017). A Multiple Case Study on the Nature and Management of Shadow Information Technology. *Journal of Information Systems*, 31(1), 79–101.

Appendices

Appendix A List of Interview Participants by Organization and Role

#	Pseudonym	Organization	Role
1	Rebecca	Metro Vancouver	Natural Resource Manager
2	Tom	Metro Vancouver	Stewardship Technician
3	James	Pacific Spirit Park Society	Director
4	Kara	Metro Vancouver	Community Development Coord.
5	Calvin	Pacific Spirit Park Society	Director
6	Susan	Wreck Beach Preservation Society	Director
7	Marcia	Pacific Spirit Park Society	Director
8	Jessica	Pacific Spirit Park Society	Director
9	Kara	Belcarra BeachKeepers	Program Coordinator
10	Melissa	Pacific Spirit Park Society	Director
11	Rita	Pacific Spirit Park Society	Director
12	William	Wreck Beach Preservation Society	Director
13	Jacky	Wreck Beach Preservation Society	Volunteer
14	June	Belcarra BeachKeepers	Program Coordinator
15	Lilly	Belcarra BeachKeepers	Volunteer
16	Johnathan	Metro Vancouver	Area Manager
17	Eric	Burnaby Lake Park Association	Director
18	Bob	Burnaby Lake Park Association	Volunteer
19	Cory	Burnaby Lake Park Association	Director
20	Mark	Burnaby Lake Park Association	Director
21	Samuel	Burnaby Lake Park Association	Volunteer
22	Laura	Burnaby Lake Park Association	Director
23	Gregory	Burnaby Lake Park Association	Director
24	Rachael	Burnaby Lake Park Association	Director
25	Curt	Metro Vancouver	Area Manager
26	Mitch	Burnaby Lake Park Association	Director
27	Peter	Metro Vancouver	Park Operations
28	Russ	Pacific Spirit Park Society	Volunteer
29	Kris	Pacific Spirit Park Society	Program Coordinator
30	Evelyn	Wreck Beach Preservation Society	Director
31	Debbie	Metro Vancouver	Community Development Coord.
32	Rose	Pacific Spirit Park Society	Director

Appendix B Interview Scripts

B.1 Interview Script for Metro Vancouver Staff

1. Would you describe your position at Metro Vancouver? How long have you been in this position? Do you think your approach to this role differs from others in similar roles Metro Vancouver? How?
2. What roles have you seen Park Partner organizations play in the maintenance and management of our regional parks? What roles have these organizations seemed to excel in, and which have given them the most difficulty?
3. Would you give me an example of how you, or other staff at Metro Vancouver, are using monitoring data collected by Park Partners? In what areas is there the greatest need for this sort of data? Have you found this data to be reliable? Why or why not?
4. In designing citizen monitoring programs, what have been your greatest challenges? How have you addressed these?
5. What sort of impacts have you seen these monitoring programs have on volunteers? Educationally? In terms of participation in other programs?
6. Given the number of people and organizations who require your expertise and assistance, how do you and Metro Vancouver manage this demand on your time? Do you have any suggestions on how this system could be improved?
7. Have the permitting and reporting requirements for Park Partners who are involved in ecological monitoring or restoration posed any difficulties? Do you have any suggestions on how this system could be improved?
8. What sort of people (age, education level, race, ability, etc.) have you witnessed taking part in community-based monitoring and restoration? Do you think these programs have a diverse volunteer base? What efforts have you made in designing these types of programs to attract a diverse group of volunteers?
9. Can you think of a time that a park partner organization did not agree with a land management decision? What happened? How would you describe your approach to dealing with criticism from Park Partners and other community organizations?
10. Have interpersonal conflicts or disagreements posed a challenge for you in your role? How do you manage situations where a difficult personality, or misunderstanding, is present?

B.2 Interview Script for Community Organization Directors and Staff

1. Would you describe your position within your organization? How long have you been in this position? Why have you pursued this role?
2. What roles have you seen your organization play in the maintenance and management of your regional park? What roles have your organization seemed to excel in, and which have given you the most difficulty?
3. **If Monitoring:** How is your data being used by Metro Vancouver? Do you think it is reliable? **If Educational:** What impact do you think your education programs are having on the larger community? **If Restoration:** What impact has your work had on the ecological health of the park? **If Advocacy:** What type of results or changes have you seen in connection to your advocacy?
4. In designing your organization's programs, what have been your greatest challenges? How have you addressed these?
5. What sort of impacts have you seen your programs have on volunteers? Educationally? In terms of participation in other programs?
6. Are staff at Metro Vancouver readily available to assist you? How do they manage your impact on their time?
7. Have the permitting and reporting requirements at Metro Vancouver posed any difficulties? Do you have any suggestions on how this system could be improved?
8. What sort of people (age, education level, race, ability, etc.) have you witnessed taking part in your programs? Do you think these programs have a diverse volunteer base? What efforts have you made in designing these types of programs to attract a diverse group of volunteers?
9. Can you think of a time that your organization did not agree with a land management decision by Metro Vancouver? What happened? How would you describe Metro Vancouver's reaction to such criticism?
10. Have interpersonal conflicts or disagreements posed a challenge for you in your role? How do you manage situations where a difficult personality, or misunderstanding, is present?

B.3 Interview Script for Community Organization Volunteers

1. Would you describe your position within your organization? How long have you been in this position? Why have you pursued this role?
2. What kind of training did you receive for your position? Can you think of ways to improve that training?
3. **If Monitoring:** Do you think that the data you have collected is reliable? How might it be improved? **If Educational:** What impact do you think your education programs are having on the larger community? **If Restoration:** What impact has your work had on the ecological health of the park? **If Advocacy:** What types of pushback have you received when advocating for change?
4. What sorts of challenges have you experienced while working in the field?
5. What sort of benefits have you received from volunteering with this organization?
6. What sorts of contact have you had with Metro Vancouver? What about other stakeholder groups in the park?
7. Do you feel that your organization vocalizes your community's worries and suggestions to Metro Vancouver?
8. What sort of people (age, education level, race, ability, etc.) have you witnessed taking part in your programs? Do you think these programs have a diverse volunteer base? What efforts have you seen made to attract a diverse group of volunteers?
9. Can you think of a time that your organization did not agree with a land management decision by Metro Vancouver? What happened? How would you describe Metro Vancouver's reaction to such criticism?
10. Have interpersonal conflicts or disagreements posed a challenge for you in your role? How was this situation handled by your organization?

Appendix C Coding and Categorization of Themes by Research Question

Below, whereas *cases* refer to the number of organizations across which a code was applied, *sources* refer to the number of interviewees associated with that code, and *references* refer to the total number of times that code was applied across the entire study.

C.1 Coding and Categorization – Research Question 1

Code	Cases	Sources	References	Thematic Category
Weekend Bias	4	14	15	Data Quality
Measurement Error	4	13	19	Data Quality
Data Entry Error	4	18	26	Data Quality
Observer Bias	4	15	18	Data Quality
Volunteer Retention	4	26	41	Capacity
Lack of Human Resources	4	13	20	Capacity
Slow Adoption of Technology	3	9	13	Procedural Barriers
Lack of Critical Technology	3	12	17	Technical/Practical Limitations
Sampling Bias	4	15	21	Data Quality
Conflicting Goals: Environmental Education	4	23	52	Conflicting Goals in Data Quality
Field Safety	5	12	14	Technical/Practical Limitations
Research Licensing Requirements	3	8	10	Procedural Barriers
Environmental Error	4	11	13	Data Quality
Conflicting Goals: Bylaw Enforcement	4	4	6	Conflicting Goals in Data Quality
Conflicting Goals: Skill Development	4	19	37	Conflicting Goals in Data Quality
Instrumental Error	4	7	12	Data Quality
Suitability for Citizen Participation	3	5	8	Technical/Practical Limitations
Perceived Lack of Data Quality	5	16	31	Data Quality
Lack of Dissemination	5	8	15	Technical/Practical Limitations; Legitimacy
Lack of Funding	4	20	73	Capacity

C.2 Coding and Categorization – Research Question 2

Code	Cases	Sources	References	Thematic Category
Communication Procedures	4	24	68	Procedural Barriers
IT Implementation Policy	2	8	14	Procedural Barriers
Resistance to Change	4	6	9	Procedural
Regulatory Oversight	4	4	6	Procedural Barriers
Signage Policy	3	9	19	Procedural Barriers
Regional Scaling	3	6	8	Procedural Barriers; Legitimacy
Lack of Information Sharing	4	15	32	Procedural Barriers
Competing Policies	3	9	10	Interorganizational Conflict
Human Resources	3	11	25	Capacity
Lack of Organizational Memory	4	22	66	Procedural Barriers; Capacity
Organizational Stress	2	4	7	Capacity
Lack of Policy Coproduction	3	3	5	Procedural Barriers
Lack of Communication at Regional Level	4	18	55	Procedural Barriers

C.3 Coding and Categorization – Research Question 3

Code	Cases	Sources	References	Thematic Category
Homophobia	3	3	5	Access and Diversity
Racism	4	12	21	Access and Diversity
Xenophobia	4	13	18	Access and Diversity
Age Gap	4	24	42	Access and Diversity
Misogyny	3	3	6	Access and Diversity
Body Shaming	1	2	9	Access and Diversity
Religiosity	1	1	3	Interorganizational Conflict
Cultural Diversity	4	27	57	Access and Diversity
Interpersonal Conflict	4	18	36	Interpersonal Conflict
Lack of Economic Diversity in Volunteers	3	16	28	Access and Diversity
Language Barriers	2	3	7	Access and Diversity
Ableism and Access	2	3	11	Access and Diversity
Rejection of Outsiders	2	6	8	Access and Diversity
Self Victimization	3	7	10	Access and Diversity
Bullying	1	2	6	Interpersonal Conflict
Lack of Communication	4	18	39	Procedural; Interpersonal Conflict
Misunderstood Intent	3	14	25	Interpersonal Conflict
Lack of Trust	1	3	9	Interorganizational Conflict; Legitimacy
Physical Threats	1	1	2	Interpersonal Conflict
Legal Threats	1	1	3	Interpersonal Conflict
Stakeholder Conflict	3	11	23	Interorganizational Conflict
Perceived Lack of Authority by Public	2	7	14	Legitimacy
Lack of Contact Between Park Associations	4	18	27	Capacity

C.4 Coding and Categorization – Research Question 4

Code	Cases	Sources	References	Thematic Category
Peer-to-Peer Training	3	11	13	Recommendation: Training
Iterative Program Development	3	8	9	Recommendation: Program Development
Group Training	3	12	17	Recommendation: Training
Program Documentation	3	19	38	Recommendation: Program Development
Inter-Rater Reliability	2	3	3	Recommendation: Training
Participatory Program Development	3	16	31	Recommendation: Program Development
Participatory Data Analysis	2	9	10	Recommendation: Program Development
Better Community Offerings	2	3	4	Recommendation: Outreach
Increased Funding by Metro Vancouver	3	5	7	Recommendation: Communication
Diversification of Funding Efforts	3	9	11	Recommendation: Capacity
Holistic Conceptualization of Data Quality	1	2	2	Recommendation: Capacity
Increased Web and Social Media Presence	3	17	24	Recommendation: Outreach
Co-Publication	1	1	1	Recommendation: Outreach
Increased Flexibility: Communication Policy	2	8	12	Recommendation: Communication
Increased Flexibility: Technology Policy	2	5	7	Recommendation: Capacity
Increase Contact Between Regional Partners	3	18	21	Recommendation: Communication
Increase Information Sharing	3	16	25	Recommendation: Communication
Increased NRM Resources	2	4	8	Recommendation: Capacity
Increased Communication: Metro Vancouver	2	9	12	Recommendation: Communication
Sensitivity and Diversity Training	3	7	11	Recommendation: Training
Increase Community Outreach: Diversity	3	21	44	Recommendation: Outreach
Increase Volunteer Safety	4	11	16	Recommendation: Program Development
Organizational Counselling Services	3	6	6	Recommendation: Capacity