Growing Closer to Nature: Students’ Environmental Attitudes and Perspectives After a Field Trip to the Bamfield Marine Sciences Centre

by

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Abstract

In this study, I measure the impact of a five-day field trip to a marine science research facility on the environmental attitudes and perspectives of British Columbian secondary science students.

I used a descriptive case study that employed a mixed methods approach to address my research questions. To collect quantitative data, the participants completed the New Ecological Paradigm survey (Dunlap & Van Liere, 2008) both before and after the trip to Bamfield Marine Research Station. I then utilized semi-structured focus groups to further elicit participants’ interpretations and reflections about the environmental experience.

Analysis of the data indicates the experience did have an impact on student attitudes and perspectives about the environment. The results of the pre-and-post New Ecological Paradigm survey showed that the environmental experience had a statistically significant impact ($p=.000$) on students’ environmental attitudes and perspectives. The semi-structured focus groups yielded three key findings: (1) participants’ pro-environmental beliefs became strengthened as a result of the environmental experience; (2) participants felt much closer and interconnected with nature as a result of the environmental experience; (3) participants developed a preference towards learning through experiential and environmental education methods, and showed evidence of metacognitive awareness and assimilation throughout the environmental experience.

This research provides insights into the impact of environmental and experiential learning pedagogies upon student attitudes about and perspectives on the environment. This research is timely as it provides support for education that addresses environmental issues, such as the potentially irreversible changes to our climate brought on by human actions.
Preface

I was inspired to conduct this research as a result of my experiences as a secondary school biology teacher in British Columbia, Canada. As an educator, I have always believed that providing students with opportunities to be in nature are equally – if not more – important to basic literacy and numeracy skills development.

This research study obtained the approval of the UBC Research Ethics Board (Behavioural Research Ethics Board; UBC BREB Number: H15-03497).
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List of Abbreviations


GAP: Global Action Programme

ESD: Education for Sustainable Development

SSI: Socioscientific Issue

NOS: Nature of Science

STEM: Science, Technology, Engineering, and Mathematics

NEP: New Ecological Paradigm

BMSC: Bamfield Marine Science Centre

SPSS: Statistical Package for the Social Sciences (IBM, 2015)

BREB: Behavioural Research Ethics Board
Acknowledgements

“Flying is learning how to throw yourself at the ground and miss”


Like flying, writing my thesis has paralleled how I believe we all learn – through trial and error; frustration and revelation; experience and reflection; making mistakes and realizing they lead to a world of new possibilities. I would like to thank:

My supervisory committee: Dr. Marina Milner-Bolotin, thank you for challenging my perspectives, encouraging me to explore new paths, and leave no stone unturned in my inquiry. Dr. Douglas Adler, thank you for deconstructing every piece of work I shared with you, and patiently helping me reconstruct a better version each and every time. It is through your collective guidance and support that I was able to complete my Master’s program. Dr. Sandra Scott, my external examiner, thank you for all your positive encouragement and continual reassurance that being lost is an inevitable and important part of the process.

My colleagues at Magee Secondary School: Ms. Mary-Lee Taylor, thank you for recognizing how meaningful and necessary our Bamfield trip is for our students as explorers of the world, and supporting my research throughout the entire program. Mr. Hamish Morrison, thank you for your mentorship and open mind over the past few years, and supporting my research. Ms. Kelly Hawbolt, thank you for your mentorship, humour, and support of my research throughout the entire program through. I look forward to our continued Friday inquiries into organic chemistry.

And most importantly, my family and friends: thank you for encouraging and supporting my education at every level. You can have me back now.
Dedication

I dedicate this thesis to two groups of stellar humans:

To the students at Magee Secondary School in Vancouver who attended the Bamfield trip in 2016. Never stop learning, and never stop exploring.

To all four of my grandparents: Brian, Betty, Charles and Lenke. From backyard camping and local fishing to Adirondack hiking trips, thank you for inspiring our family’s love for the outdoors.
CHAPTER 1: Introduction to the Study

Study Background

The problem with our modern education system, according to American environmental scholar and educator David Orr (1994, p. 8), is the separation from the values and perspectives that allowed humans to exist on Earth for hundreds of thousands of years. Despite what Orr (1994, p. 9) describes as an “information explosion,” where the quantity of and accessibility to information has increased significantly, there has been no increase in knowledge or wisdom. Consequently, we have learned how to memorize facts, theories and equations based on abstract concepts, but lost our connection with and understanding of nature. Some theorists have suggested that this problem stems from an anthropocentric, a human-centred, worldview, where the welfare of humankind has more value than the welfare of the natural world (Haigh, 2006; Naess, 1973; Orr, 1994, p. 8). While debates on how to correct or improve our modern education may never end, the difficult task of uniting education with values and perspectives that align with sustainable development is now suggested to be a global education priority (Annan, 2001; Haigh, 2006).

Yet, as Jickling (1992) points out, there is “muddle” surrounding the definition of sustainable development, especially within the context of education. For example, as Huckle (1991) suggests, sustainable development possess different meanings for technocentric (the worldview that human ingenuity and technology can control and protect nature) and ecocentric (the worldview that humans and nature are interdependent on one another) perspectives. This lack of a true and coherent definition of the term leads Jickling (1992) to suggest several reasons why educating for sustainable development is an ill-informed pursuit. First, it is unwise to adhere to any educational “prescription” for an idea that is conceptually
incoherent or poorly understood. Second, if education’s purpose is to enable people to think for themselves about a concept (through their body of knowledge, depth and breadth of understanding), then we should not educate for anything as we are prescribing an outcome instead of allowing the person to develop their own perspectives and beliefs (Jickling, 1992). Nevertheless, if education is to raise learners to all think for themselves, how are we to foster the knowledge, skills, attitudes, and values required to address the environmental issues facing our planet? As Wals (2010) suggests, unless we educate with some level of prescribed pro-environmental stance, the problems of education pointed out by Orr (1994) may persist. Thus, despite the difficulty in incorporating sustainable development into education, the task is necessary if we are to avoid repeating the same mistakes in education as before. That said, Wals (2010) cautions that education for sustainable development (ESD) needs to incorporate the values that promote sustainable practices (e.g., through real-life experiences) instead of simply promoting sustainable development ideologies through curricular content.

On a global scale, the United Nations Educational, Scientific, and Cultural Organization’s (UNESCO) Global Action Programme for Education for Sustainable Development (GAP for ESD) (2015) commenced in early 2015. ESD focuses on enabling students to actively learn about and take action on issues related to environmental integrity, economic viability, and cultural diversity through four dimensions: learning content; pedagogy and learning environments; learning outcomes; and societal transformations (UNESCO, 2015). These four dimensions are outlined in detail in Table 1.
Table 1

Four dimensions of ESD

<table>
<thead>
<tr>
<th>Learning content</th>
<th>Integrating critical issues, such as climate change, biodiversity, disaster risk reduction, and sustainable consumption and production, into the curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedagogy and learning environments</td>
<td>Designing teaching and learning in an interactive, learner-centred way that enables exploratory, action-oriented and transformative learning. Rethinking learning environments – physical as well as virtual and online – to inspire learners to act for sustainability</td>
</tr>
<tr>
<td>Learning outcomes</td>
<td>Stimulating learning and promoting core competencies, such as critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations</td>
</tr>
<tr>
<td>Societal transformations</td>
<td>Empowering learners of any age, in any education setting, to transform themselves and the society they live in</td>
</tr>
</tbody>
</table>

The overall goal of the UNESCO GAP for ESD (2015) is to weave sustainable development and education together. This goal is supported through two objectives:

1. To reorient education and learning so that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development – and make a difference

2. To strengthen education and learning in all agendas, programmes and activities that promote sustainable development.

These objectives, which focus more on values and practices in education than content (thus addressing the concerns of Wals (2010)) are targeted for those who have a direct effect on what and how students learn and develop, such as curriculum writers. Direction on how
curriculum writers could incorporate the objectives of ESD, is provided through five “Priority Action Areas” of the UNESCO GAP for ESD (2015) as outlined in Table 2.

Table 2

**GAP for ESD Priority Action Areas**

<table>
<thead>
<tr>
<th><strong>Advancing Policy</strong></th>
<th>Mainstream ESD into both education and sustainable development policies, to create an enabling environment for ESD and to bring about systemic change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transforming learning and training environments</strong></td>
<td>Integrate sustainability principles into education and training settings</td>
</tr>
<tr>
<td><strong>Building capacities of educators and trainers</strong></td>
<td>Increase the capacities of educators and trainers to more effectively deliver ESD</td>
</tr>
<tr>
<td><strong>Empowering and mobilizing youth</strong></td>
<td>Multiply ESD actions among youth</td>
</tr>
<tr>
<td><strong>Accelerating sustainable solutions at local level</strong></td>
<td>At community level, scale up ESD programmes and multi-stakeholder ESD networks</td>
</tr>
</tbody>
</table>

One area where the UNESCO GAP for ESD (2015) has had an influence on education curriculum and pedagogy is in British Columbia (BC), Canada. A recent curriculum transformation has occurred in BC through a staggered implementation of new K-12 learning content and pedagogies that reflect sustainable development in BC, where there is a significant focus on First Peoples’ concepts of interconnectedness and holistic sustainability. There is a growing focus on ESD within local teacher training and professional development settings in BC that reflect the Priority Action Areas (UNESCO, 2015) of “building capacities of educators and trainers” and “transforming learning and training...
environments”. For example, Simon Fraser University in Burnaby BC runs a sustainability and environmental education module in their teacher education program, known as the SEEDs module. For practicing teachers, there is also an increase in the number of ESD focused professional development opportunities. A grassroots movement known as *Classrooms to Communities* has developed a province-wide strategy for infusing ESD into many local professional development settings through the support of several governmental and teacher union-based organizations such as Metro Vancouver and the Environmental Educators Provincial Specialists Association. This movement also reflects the “accelerating sustainable solutions at a local level” component of the Priority Action Areas (UNESCO, 2015).

Mirroring the “advancing policy” element of the Priority Action Areas (UNESCO, 2015), many ESD perspectives are found within a set of universal student proficiencies throughout all grades and subjects known as Core Competencies (British Columbia, 2015). For example, the Social Responsibility Core Competency requires all students, regardless of their grade level or subject of study, to “consider the interdependence of people with each other and the natural environment” and “contribute positively to one’s family, community, society, and the environment.” ESD content and perspectives are further embedded in many of the Grade 11 Life Sciences Curricular Competencies (British Columbia, 2016, pp. 2-3), as outlined in Table 3.
Table 3

Examples of ESD in Grade 11 Life Sciences Curricular Competencies

| Processing and analyzing data and information | • Experience and interpret the local environment  
|                                                | • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information |
| Evaluating                                    | • Consider social, ethical, and environmental implications of the findings from their own and others’ investigations |
| Communicating                                 | • Express and reflect on a variety of experiences, perspectives, and worldviews through place |

Given these global and local trends in education, I contend it is important to conduct research investigating how the infusion of ESD learning content and pedagogies into the BC curriculum affects student attitudes and perspectives about the environment and their own learning. In this study, I focus on how two specific interrelated ESD perspectives impact students’ environmental attitudes and perspectives: (1) environmental education; and (2) experiential education. Environmental attitudes are the beliefs, intentions, and feelings one has about the environment and its related issues. Environmental perspectives (specifically, environmental concern), such as biocentric or anthropocentric worldviews, are an underlying aspect of environmental attitudes (Bruni, Chance, & Schultz, 2012; Schultz et al., 2005). I refer to the synthesis of environmental education and experiential education as an “environmental experience”, where experiential education is the process through which environmental education is presented. Both of these perspectives are discussed in Chapter 2.
Problem Statement and Significance

The BC curriculum (2015, 2016) not only encourages but requires teachers to provide opportunities for learners to be able to “develop the knowledge, skills, values and attitudes that empower them to contribute to sustainable development” (UNESCO, 2015). A growing body of research suggests that students who learn about the environment while in the environment (as in the case of an environmental experience) develop pro-environmental attitudes and understandings (Ballantyne, Anderson, & Packer, 2010; Ballantyne, Fien, & Packer, 2001; Ballantyne & Packer, 2002, 2009). Research also suggests that students who learn through experiential methods often exhibit a metacognitive level of engagement and control over their own learning (Anderson & Nashon, 2007; Nielsen, Nashon, & Anderson, 2009). However, a literature search revealed limited research on assessing the impact of an environmental experience upon secondary science students in BC (Ballantyne et al., 2010; Shephard, Mann, Smith, & Deaker, 2009). Therefore, my study aims to explore how a five-day environmental experience impacts the environmental attitudes and perspectives of BC secondary science students.

Study Context: Purpose and Research Questions

Purpose

The purpose of my study is to investigate and analyze the impact of a five-day long environmental field trip on the environmental attitudes and perspectives of BC secondary science students. My study intends to describe the nature and potential underlying factors of the impact.
Research Questions

The investigation into the impact of a five-day environmental experience on the environmental attitudes and perspectives of BC secondary science students was guided by the following questions:

1. What is the impact of an environmental experience on the environmental attitudes and perspectives of BC science students?

2. How might environmental attitudes and perspectives of BC science students shift as a result of the environmental experience, as measured by both quantitative and qualitative methods? (i.e., are they more or less pro-environmental)

3. What facets of the environmental experience might lead to change(s) in the environmental attitudes and perspectives of BC science students?

Study Significance

Given the recent curriculum revisions in BC, teachers (myself included) are curious to understand how environmental experiences impact students’ attitudes and perspectives about the environment. Therefore, this study will provide timely grist for the mill for these teachers while also adding to the body of literature investigating the different ways experiential education impacts student attitudes and perspectives.

Researcher Background

My experiences both as a biology teacher and conservationist in BC have inspired me to investigate how students could best develop skills and attitudes to understand in-depth
critical environmental issues such as climate change, species extinction, and resource management and depletion. I have spent several years implementing ESD and environmental education pedagogies into my own teaching, such as field trips and experiential activities, and I have observed change in many of my students’ attitudes about the environment as a result.

Thesis Overview

This thesis consists of six chapters. Chapter one introduces the study, problem statement, purpose, research questions and significance. Chapter two presents a theoretical framework through which to consider the research and a literature review of prior related research. Chapter three provides a comprehensive description of my methodology and research design, including my study structure and setting, data sources, data collection methods, and data analysis methods, as well as an overview of the ethical considerations and limitations of my study. Chapter four presents the findings and analysis of the study based on a pre-and-post survey and semi-structured focus group interviews. Chapter five includes a discussion of how the findings addressed the research questions and suggests avenues of further research. Lastly, Chapter six concludes the thesis through a summary of the research and findings, as well as discussion about the practical and theoretical implications of this thesis.
CHAPTER 2: Theoretical Framework and Literature Review

To begin this chapter, I will introduce and discuss experiential learning theory as my theoretical framework and discuss the connection to relevant learning perspectives such as constructivism. Next I will provide the background of environmental education. Then, I will discuss environmental education using socioscientific issues (SSIs), such as environmental issues in science education. Lastly, I will review the existing research on environmental education and the impact on students’ environmental attitudes and perspectives.

Experiential Learning Theory

A significant amount of educational research on experiential learning theory has led to a wide range of perspectives on how to best implement this theory in different educational contexts. For example, experiential learning theory has been investigated within adult education (Malinen, 2000), nursing education (Lisko & O'Dell, 2010), game-based education (Kiili, 2005), medical education (Maudsley & Strivens, 2000), English as a second language education (Kohonen, 1992), and environmental education (Adkins & Simmons, 2002; Mittelstaedt, Sanker, & VanderVeer, 1999). However, experiential learning theory was not originally conceived through an educational lens; rather, it is a combination of many years of tension and conflict between several dichotomous schools of thought, most notably in the fields of philosophy and psychology (Kolb & Kolb, 2009). In this section, I discuss the origins and development of experiential learning theory, specifically as it pertains to education.

In the late 19th century, a tension existed between rationalists and empiricists. Rationalists argued that reality lies solely within the mind and is developed through logical...
and reasoned thought. Empiricists believed experiences that take place outside the mind are the source of all realities, regardless of how we interpret or think about them. In his writings on radical empiricism, James (1912) claims that the these two ideas are not necessarily contradictory. As explained by Kolb and Kolb (2009), James’ concept of radical empiricism proposes that experiences exist both outside of and within the mind. More specifically, while the concrete experiences that empiricists resonate with certainly exist, the reflection and interpretation of these concrete experiences within our mind are also experiences within themselves. Thus, reality is a continual flow of experiences where we live through a concrete experience, then reflect on and interpret these experiences into our own realities before moving on to a new concrete experience (Kolb & Kolb, 2009).

While experiential learning theory was still decades away from being fully articulated, Dewey (1929, 1936) offered an early framework for how holistic experiences were not only relevant but also vital in understanding how learners learn. Dewey (1929, pp. 52-56) postulated that learning occurs through concrete experiences followed by inquiry and reflection of these concrete experiences. Furthermore, without such concrete experiences, learning becomes a meaningless and incomprehensible abstraction. Dewey (1936, pp. 39-40) further elaborates that these concrete experiences are most effective when they parallel the learner’s life both inside and out of the learning environment. When these conditions are met, as explained by Kolb (1984, p. 32), experiences become the central source of learning for students.

Nonetheless, while concrete experiences act as the original source of one’s learning, conscious thought and abstract conceptualization of the experiences are equally as important, as originally suggested by James (1912) and further explained by Kolb, Rubin, and McIntyre.
(1971) in their first description of experiential learning theory. However, experiential learning theory was introduced during an era where conscious thought was not recognized as a necessary component of learning. Instead, the theories of behaviorism developed by Watson (1913) and Skinner (1974) reigned as the dominant paradigms within both the psychology and education research communities. Behaviorism, as a learning theory, suggests that learning is an objective, sub-conscious process where the behaviour of an individual (or population) is controlled by a repeated environmental stimulus; hence the popularity of writing lines such as “I will not make farm animal sounds during class time” one hundred times on the blackboard while in detention!

Yet, conscious thought and both concrete and abstract experiences eventually found their way back into the dominant paradigm of learning theory. Flavell’s (1979) concept of meta-cognition (i.e., thinking about thinking) changed the landscape of education by opening the door to conscious thought as a potential pathway of learning. This new paradigm provided a platform for Kolb (1984) to adapt experiential learning theory into an educational context that provided a framework for how both concrete and abstract experiences serve as the mechanism of learning. Notably, Kolb (1984, pp. 31-33) suggests that when students are engaged in their learning through concrete experiences, abstract concepts can be integrated into their understanding. Kolb (1984, p. 33) illustrates this in his cyclical “process of experiential learning,” where concrete experiences are consciously reflected upon, then hypothesized into an abstract concept, which is then experimented upon or transferred into a concrete understanding of the concept. Once students have comprehended the new, abstract concept, and it has become a new concrete concept for them, the cycle continues with a new experience, as shown in Figure 1.
Simply described, learning is the “process whereby knowledge is created through transformation of experience” (Kolb, 1984, p. 41). Since this process is cyclical, learning no longer occurs through a linear progression. Instead, learning becomes a recursive process whereby each time a concept is experienced, reflected upon and transformed, it becomes further interconnected with and deeply related to the learner’s existing knowledge-base (Kolb & Kolb, 2009). Furthermore, since the experience exists within a conscious state of mind, learners are capable of thinking meta-cognitively about their own learning, as suggested by

![Kolb's Process of Experiential Learning](image)

**Figure 1: Kolb’s Process of Experiential Learning**

Flavell (1979) and Kolb and Kolb (2009). This allows for learners to self-regulate their own learning, and subsequently leads them to make their own informed decisions on which concepts require more of their attention in order to understand (Anderson & Nashon, 2007; Nelson, 1996).
Experiential learning theory, as described by Kolb et al. (1971) and Kolb (1984), was also significantly influenced by the writings of Piaget (1964), who is widely credited with popularizing constructivism as a learning perspective (Kolb, Boyatzis, & Mainemelis, 2001, p. 227). Constructivism postulates that learners develop their body of knowledge by actively constructing (and establishing ownership over) their knowledge through concrete experiences (Von Glasersfeld, 1989). Thus, constructivism and experiential learning theory go hand in hand, where students actively construct new knowledge through a concrete experience, followed by the reflection, abstraction, and transformation of the experience. Furthermore, this model can be connected to Posner, Strike, Hewson, and Gertzog’s (1982) model of conceptual change. Posner et al. (1982), who were also influenced by the writings of Piaget (1964), based a lot of their work off of the writings of Kuhn (1966) who first proposed the idea of large scale conceptual changes in scientific knowledge. According to Posner et al. (1982), the concrete experiences that learners live through can be either assimilated or accommodated into their current worldview. If an experience fits into a learner’s current worldview, it simply becomes a new component of that worldview through assimilation. However, if the experience clashes with the learner’s current worldview, the experience must then be accommodated by the learner, who reconstructs their worldview to include the new experience (Posner et al., 1982).

Experiential learning theory has become a popular and widely accepted learning theory amongst both researchers and educators, possibly as a result of the applicability and connectivity with other widely accepted theories and models such as constructivism. However, while experiential learning theory has increased in popularity in educational research, it has also been criticized, often for the oversimplification of how learning occurs.
For example, regarding the cyclical, step-wise nature of experiential learning theory, Quay (2003) argues that such a simplified model ignores the true holistic nature of experiential learning. This sentiment is seconded by Seaman (2008) who claims that the constructivist perspective (where learners actively construct knowledge and understanding through their experiences) and cyclical model of experiential learning theory cannot appropriately describe the connection between the learner and the social or physical learning environment as it focuses too much on the individual. Seaman (2008) elaborates, stating that this connection between the learning environment and individual is vital in ESD pedagogies, such as outdoor education.

Another critique of experiential learning theory, especially within the constructivist perspective, takes aim at Kolb’s (1984) description of the different stages in the experiential learning cycle. Miettinen (2000) suggests that Kolb (1984) failed to show how the terms *concrete experience, reflective observation, abstract conceptualization,* and *active experimentation* are related to one another or even match the stages in the cycle. Miettinen (2000) then proposes that the experiential learning cycle should not be used to describe how learning occurs, but rather as a tool for training oneself to learn better.

In their critique of a collection of many “minimal-guidance” learning perspectives, Kirschner, Sweller, and Clark (2006) suggest that experiential learning and other open-ended learning perspectives fail to actually lead to successful student learning. Kirschner et al. (2006) cite “half a century” of empirical evidence to claim that open-ended and minimal-guidance learning perspectives fail to fit with our understanding of human cognitive anatomy, and that students require direct-guidance in their learning of modern curricular concepts. However, Hmelo-Silver, Duncan, and Chinn (2007) argue that Kirschner et al.
Kuhn (2007) suggests that Kirschner et al. (2006) fail to address how students might stay engaged and motivated in learning through direct-guidance, and that students need to be actively involved in exploring the learning content in order to stay motivated. Moreover, in another response to Kirschner et al.’s (2006) claim that direct-guidance instruction is more effective than all minimal-guidance instruction methods, Dean Jr and Kuhn (2007) suggest that direct-guidance instruction actually fails to lead to long-term knowledge acquisition and maintenance. Nonetheless, further research that investigates whether experiential learning theory itself is compatible with modern perspectives of human cognitive anatomy would be timely, as there is a significant amount of empirical evidence that supports the effectiveness of experiential learning theory in many different education contexts, including environmental education (Adkins & Simmons, 2002; Seaman, 2008).

Despite the critiques of experiential learning theory, it is the most appropriate learning perspective for this study for several reasons. First, a major assumption in my study is that experiences could serve as agents of learning or cognitive change – specifically, a change in environmental attitudes and perspectives. Furthermore, there would be little sense in conducting a study that investigates the impact of experiential education through a non-experiential learning perspective, such as direct instruction. Lastly, as a teacher and a researcher, I have anecdotally observed students grow and change as a result of experiential education. As a result, I would like to understand whether my anecdotal observations are in fact supported through empirical research.
Background of Environmental Education

In relation to this study, environmental education is seen as interdisciplinary, cross-curricular, and holistic (Scott, 2007). However, this has not always been the case as environmental education has undergone many reforms, debates, and even a conceptual commandeering over the past century. In this section, I will provide a clear definition of environmental education, summarize key events and growing pains in the history of environmental education, and examine environmental education within both BC and Canadian literature.

From the late 1800s to the mid 1900s, several interdisciplinary and multidisciplinary learning pedagogies, such as nature study and conservation education, arose out of different environmental events (such as the 1930s drought) and revolts against traditional classroom education (Daudi & Heimlich, 1997). Shortly after Carson’s (1962) monumental work Silent Spring was published, environmental education was formally defined for the first time by William Stapp (1969):

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution, (pp. 30-31)

Through this original definition, environmental education became an action-oriented pedagogy that grew through several UNESCO conferences, beginning with the Tbilisi Declaration (1977). The Tbilisi Declaration (1977) endorsed Stapp’s (1969) original definition of environmental education while adding several other elements, including an ethic of care, concern, and responsible action. The outcome was a globally recognized and action-oriented definition of environmental education. Several issues have arose since the Tbilisi
Declaration (1977), including debates about the relationship between environmental education and Education for Sustainable Development (ESD) (Jickling, 1992; Jickling & Wals, 2012), whether environmental education is an interdisciplinary pedagogy (Disinger, 2001; Gruenewald & Manteaw, 2007), and the struggle to find concrete teaching ideas or models of incorporating environmental education into practice (Scott, 2007).

Addressing the relationship between environmental education and ESD, Jickling (1992) argues that UNESCO (1988) commandeered the concept of environmental education as a means to push the ESD notion of “training” learners to incorporate principles of sustainable development. As mentioned earlier, ESD is an ill-defined concept that promotes both educating for sustainable development and environmental responsibility – a task that some researchers believe cannot occur simultaneously (Jickling & Wals, 2012). However, in a world where development continues to occur (and will likely continue for the foreseeable future), education that promotes sustainable development while increasing awareness and concern for the environment and environmental issues seems to be the most reasonable way forward (Adkins & Simmons, 2002; Sauve, 1999; Wals, 2010). The most recent objectives of UNESCO’s (2015) ESD address some of Jickling’s (1992) concerns as they no longer focus explicitly on training, but rather focus is placed on empowering learners through learner-centred pedagogies to develop the necessary skills, knowledge, attitudes, motivations and commitments required for students to take action on environmental issues both now and in the future. These objectives reflect features of environmental education described by Adkins and Simmons (2002) and Palmer (1998). Palmer (1998) elaborates further, suggesting that in order to foster these necessary skills, knowledge, attitudes, motivations and commitments,
environmental education needs to focus on education about the environment, in the environment, and for the environment (Palmer, 1998).

Another area of disagreement related to environmental education is related to how to best integrate it into a curriculum. Gruenewald and Manteaw (2007) point out that there have been struggles to incorporate environmental education experiences and content into curricula, especially in a system where standards dictate the curriculum content. This has led to environmental education often being implemented as a standalone discipline, rather than a cross-curricular lens (Gruenewald & Manteaw, 2007). Nonetheless, several researchers suggest that environmental education is most appropriate as a standalone discipline in itself due to the focus on interconnectedness of people and the environment (Disinger, 2001) and the distinct methodology and philosophy through which it is taught (Greig, Pike, & Selby, 1987). However, this exacerbates what Orr (1994, pp. 7-8) describes as the problem with education, where education fails to properly foster the necessary skills and attitudes among students for a healthy society and planet. In his book *Earth in Mind: On Education, the Environment, and the Human Prospect*, Orr (1994) claims that “all education is environmental education” (p. 12), and that regardless of the subject area, environmental issues are strongly embedded throughout the entire curriculum at all levels of education (Orr, 1994, pp. 12-13).

The interdisciplinary focus of environmental education has been stressed in Canada through the work of Hart, Jickling, and Kool (1999), who offer a series of questions that provoke thought on how to best infuse environmental education into a curriculum through an interdisciplinary and cross-curricular lens. Their questions, which focus on uniting good education in general with environmental education, includes a central inquiry into whether
environmental education is capable of engaging students to: think critically and creatively; explore how their attitudes might be shaped by different environmental experiences; and use systems thinking to investigate real world issues (Hart et al., 1999). They further their claim that environmental education is interdisciplinary by suggesting that within key BC government documents, such as *Environmental concepts in the classroom* (1995), it is clear that environmental education is more than just science education.

Since the release of the (1995) document, the BC government has released several updated documents that not only stress the interdisciplinary aspect of environmental education, but also address Scott’s (2007) concerns regarding the practical implantation of environmental education in classrooms. For example, the *Environmental learning and experience: an interdisciplinary guide for teachers* (2007) provides a model known as C.A.R.E. (which stands for Complexity, Aesthetics, Responsibility, and Environmental Ethic) to describe different ways to incorporate environmental education into any K-12 discipline through an experiential and constructivist perspective. Furthermore, as mentioned in Chapter One, the recently revised BC curriculum (2015) includes specific environmental education language within the *Personal and Social Responsibility Core Competency*, which is mandated to be incorporated into all K-12 disciplines.

Thus, after over 20 years after Orr’s original call for cross-curricular environmental education, the new BC curriculum finally provides an opportunity for threading environmental education throughout the entire K-12 education system (British Columbia, 2016). Environmental education in BC, and in the context of this study, thus reflects Palmer’s (1998) call for environmental education to be *about* the environment, *in* the environment, and *for* the environment.
Using Socioscientific Issues (SSIs) in Science Education

In this study, BC secondary science students learned about scientific and environmental issues while in the environment. As suggested by Zeidler, Walker, Ackett, and Simmons (2002), environmental issues within a scientific perspective are considered to be Socioscientific Issues (SSIs). SSIs are often defined as scientific concepts that are highly debated, open-ended, and often complex in nature (Sadler & Zeidler, 2005). Examples of SSIs include vaccinations (Hodson, 2013), genetic engineering (Sadler & Zeidler, 2005), and the wide range environmental issues currently facing our planet (Zeidler et al., 2002). SSIs are often incomplete and inconclusive, leading to many people holding a wide diversity of beliefs (Hodson, 2013). Moreover, when SSIs are incorporated into a curriculum through student-led, problem-based lessons, they are highly effective in promoting critical thought and dialogue amongst students (Hodson, 2013). Furthermore, by incorporating and focusing on SSIs (i.e., environmental issues) in science is one way to help students actively construct an awareness and understanding of environmental issues (Zeidler et al., 2002).

According to Hodson (2013), SSIs are ideal for science education as they present controversies that reflect the actual intrinsic nature of science (NOS). NOS is not so much defined by a concise statement (Crowther, Lederman, & Lederman, 2005) but rather is described by five general yet distinct characteristics that together describe the key features of scientific knowledge: (1) tentative; (2) empirically based; (3) subjective; (4) developed through human inference, creativity, and imagination; and (5) socially and culturally embedded (Akerson, Abd-El-Khalick, & Lederman, 2000).
Thus, many educators suggest that SSIs are fundamental to developing scientific literacy (Driver, Newton, & Osborne, 2000; Sadler, Barab, & Scott, 2007) and critical thinking skills of students (Sadler et al., 2007). However, even with the significant benefits of using SSIs in science course, there are challenges.

Using SSIs in science education may take a significant amount of time, as students are required to spend time actively developing beliefs and attitudes about the content (Sadler et al., 2007). Nonetheless, in a curriculum where student-directed learning is supported, such as the new BC curriculum (British Columbia, 2015), time away from traditional learning is not a concern.

Another concern, according to Hodson (2013), is science educators often include SSIs in lessons that consist of “thinly-disguised teacher-directed learning” which limits opportunities for critical thinking or student-led discussion. However, research shows that with the increased understanding of how to best incorporate SSIs within science education (i.e., through cross curricular educator collaboration), science educators may feel more comfortable using SSIs within open-ended, student-led lessons (Day & Bryce, 2011; Hodson, 2013).

Literature Review

I identified eighteen studies that investigated the effect of environmental education on student perceptions and/or attitudes about the environment and learning. Four of these studies were conducted using qualitative methods (Ballantyne et al., 2010; Dahlgren & Öberg, 2001; Dawson & Carson, 2013; Kwan & So, 2008). In a study that took place at a university in Sweden that investigated best questions for assessing environmental education and problem-based learning pedagogy, Dalhgren and Öberg (2001) found that questions promoting self-
reflection initiated deeper understanding of environmental issues and positive student perceptions of the learning process. Problem-based learning consists of providing opportunities for students to learn the relevant content by working together to solve or address authentic problems that are related to the issue of study (Hmelo-Silver, 2004). In their study assessing how an environmental experience affects Australian secondary school biology students’ learning and metacognition, Ballantyne et al. (2010) found that environmental experiences consisting of classroom learning as well as learning in the natural environment were effective in eliciting students’ metacognitive thought about and appreciation for the environment. The research by Kwan and So (2008) and Dawson and Carson (2013) paralleled Dahlgren and Öberg’s (2001) findings, as their case studies both suggested that students from Hong Kong developed a stronger awareness of environmental issues and a more positive and comfortable perception towards the environment through their environmental education programs.

In my literature search, I identified five quantitative studies that focus on the effect of the environmental education on student attitudes towards the environment and their own learning process (Fielding & Head, 2012; McCright, 2012; Mifsud, 2011; Shephard et al., 2009; Uitto, Juuti, Lavonen, Byman, & Meisalo, 2011). In their study, Shephard et al. (2009) used the New Ecological Paradigm (NEP) scale (Dunlap & Van Liere, 2008) to benchmark the environmental attitudes of incoming undergraduate students to a post-secondary institution in New Zealand. They found that students had a wide array of environmental attitudes, with significant trends based on gender, department, and age of the students (Shephard et al., 2009). Research on secondary students in Malta by Mifsud (2011) found that students held generally positive views about the environment, but few actually took
action on environmental issues. Furthermore, Mifsud (2011) suggested that students identified school as the primary source of their information about the environment. In another study from Finland, (Uitto et al., 2011) found that while many students already held generally positive attitudes about the environment, they are more likely to be invested in environmental issues if their school supports or incorporates environmental education opportunities into their courses and/or extracurricular programs. Similar research conducted by Fielding and Head (2012) suggests that Australian science students have strong pro-environment attitudes, especially in action-oriented environmental education settings. Lastly, through an inquiry project focused on climate change, McCright (2012) found that undergraduate STEM students in Michigan developed a more refined understanding of science, sociology, and the environment.

An additional three studies related to student perceptions and attitudes towards their learning about, in, and for the environment were conducted through mixed methods (Gautreau & Binns, 2012; Rioux & Pasquier, 2013; Ruiz-Gallardo, Verde, & Valdés, 2013). Through pre and post open-ended tests and surveys, Gautreau and Binns (2012) found that despite Louisiana secondary science students showing no significant attitude change towards the environment throughout a placed-based learning course, their environmental awareness and knowledge might have increased. Place-based learning provides an opportunity for students to learn from their local “place,” whether it is a natural place, cultural place, or ontological place. Within this pedagogy, students act as creators of knowledge, are responsible for determining the content of study, and are guided by or co-learn with teachers or community resources (Gautreau & Binns, 2012). Additional concern was observed in Rioux and Pasquier’s (2013) longitudinal study conducted in France, where they found that
students did not retain an increased pro-environment attitude three years after their original pro-environmental action intervention.

However, significant evidence for environmental education’s positive impact on student perceptions/attitudes was found in Ruiz-Gallardo et al.’s (2013) study using sixty-three “disruptive and low performance” Spanish secondary students. Ruiz-Gallardo et al. (2013) found that students developed significant increases in behavioral control, critical thought and content knowledge, self-esteem, and self-confidence as a result of a Garden-based Learning intervention.

Chapter Summary

In this chapter, I presented a brief summary of environmental education and experiential education. Next, I discussed how socioscientific issues provide the theoretical framework for my study. Last, I provided a review of relevant studies that investigate the combination of environmental education and experiential education to illustrate how and where my study fits into the body of literature, specifically the need to assess the impact of an environmental experience upon secondary science students in BC (Ballantyne et al., 2010; Shephard et al., 2009). In the next chapter, I will provide a comprehensive overview of my study’s methodology, including the research design and data collection and analysis methods.
CHAPTER 3: Methodology and Research Design

My intent was to investigate how a five-day environmental experience affects BC secondary science student attitudes and perspectives about the environment. In order to do that, I conducted and analyzed the results of a pre-and-post survey and augmented it with semi-structured focus groups. In order to answer my research question, I used a descriptive case study approach as I was interested in analyzing the phenomenon in depth within the bounded system of a single group of students (Merriam, 1998, p. 8). In this section, I restate my research questions, then justify why the descriptive case study approach is appropriate in this particular study, particularly in addressing the research questions. I then present a comprehensive overview of my study’s structure and setting, including a comprehensive overview of the five-day trip to the Bamfield Marine Sciences Centre. Next, I discuss my data sources, collection/preparation and analysis, and make comments on my study’s validity, ethics and limitations. Lastly, I provide a brief summary of the chapter.

Research Questions

1. What is the impact of an environmental experience on the environmental attitudes and perspectives of BC science students?

2. How have the environmental attitudes and perspectives of BC science students shifted as a result of the environmental experience, as measured by both quantitative and qualitative methods? (i.e., are they more or less pro-environmental)

3. What facets of the environmental experience might have led to change(s) in the environmental attitudes and perspectives of BC science students?
Descriptive Case Study Approach

Case studies vary widely in their definition and usage within research. For this reason, VanWynsberghe and Khan (2007) caution that case studies have become a meaningless “catch-all” for researchers in search of an appropriate method, research design, or methodology. However, the authors continue that as a methodology, case studies are appropriate when they include seven particular features as described by (VanWynsberghe & Khan, 2007) and Khan (2008). These features are outlined in Figure 2.

1. *Small N* – a small number of participants to allow for intensive in-depth focus
2. *Contextual detail* – the reader develops a sense of “being there” (MacDonald & Walker, 1975, p. 182)
3. *Natural settings* – the study involves complex, natural situations where there is little researcher control over the behaviour, organization, or events
4. *Boundedness* – the case study investigates and provides description of a particular time and place
5. *Working hypothesis and lessons learned* – the case study allows new lessons to emerge throughout the course of study can be included in the data collection and analysis
6. *Multiple data sources* – used to triangulate and validate the small number of participants
7. *Extendability* – the study resonates with the reader and provides new avenues of understanding and experience

<table>
<thead>
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<th>Figure 2: Features of case studies</th>
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<tr>
<td>I adopted a descriptive case study approach to investigate the impact of a five-day environmental experience on the environmental attitudes and perspectives of BC science students. I used this model because it allowed me to describe a phenomenon, such as a shift in environmental attitudes and perspectives, in depth amongst a single group (i.e., BC science</td>
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students) while simultaneously adding to the growing body of literature behind the impact of environmental experiences on students (Merriam, 1998; Yin, 2013). Furthermore, I believe my study meets the seven features depicted in Figure 2 by VanWynsberghe and Khan (2007) and Khan (2008).

First, my study has a relatively small $N$ with only 27 participants overall, and a subsample of 15 participants for the semi-structured focus groups. This allowed my data to be collected and analyzed without becoming unmanageable through a high $N$. Second, my study focuses on one particular experience of a single unit of analysis (i.e., the participants) in a single place and time (i.e., Bamfield, BC in April of 2016). While the participants were aware that a study was taking place related to their experience in Bamfield, the experience itself was not altered or controlled for the sake of the study. In other words, the participants were free to think, act, and feel normally throughout the experience and data collection. Third, my research questions were flexible and open to any potential outcome of the study. I was not looking for one particular type of impact, but rather, any impact regarding participants’ attitudes and perspectives about the environment. Fourth, my study employed multiple sources of data by using both surveys and semi-structured focus group interviews. Last, my study offers avenues for further research based on the findings, and thus an opportunity to extend the experience beyond the study.

Study Structure

This study incorporated a mixed methods approach to address the research questions. The quantitative component involved using a pre-and-post survey to measure student attitudes about the environment before and after the environmental experience in Bamfield.
The qualitative component involved using semi-structured focus groups with a subsample of the participants in order to further explore their interpretations of how the environmental experience in Bamfield impacted their attitudes and perspectives about the environment. I selected a mixed methods approach because it allowed me to collect and compare both quantitative and qualitative data. According to Creswell (2013, p. 203), using a mixed methods approach allows for researchers to “gain more insight” into the phenomenon than using only a quantitative or qualitative method.

As a research approach, mixed-methods is popular in various fields of research as it addresses complexities of research that singular quantitative and qualitative approaches often cannot address alone, such as the need to triangulate data from multiple sources (Creswell, 2013, pp. 203-204). Creswell (2013, p. 204) notes that the mixed methods approach may have actually spawned from such a need to triangulate data, as originally suggested by Jick (1979). As mixed methods has grown in popularity, it has started to take on multiple monikers, such as synthesis, integrating, qualitative and quantitative methods, and multimethod and others; however, mixed methods has become the most widely used name (Bryman, 2006; Creswell, 2013, p. 205). Nonetheless, despite the growth in its popularity, Creswell (2013, p. 205) notes that there are challenges to mixed methods perspectives. These challenges include: the requirement of a large amount of data to be collected; the increased amount of time it takes to collect and analyze the data; and the need for the researcher to be familiar with both quantitative and qualitative methods (Creswell, 2013, p. 205).

When using a mixed methods approach, there are several aspects a researcher needs to consider. These aspects include the timing of each method, how much weight is applied to each method, and whether to mix the methods together throughout the research (Creswell,
2013, pp. 206-208). These are outlined in Table 4, adapted from Creswell, Plano Clark, Gutmann, and Hanson (2003).

Table 4

Considerations of a mixed methods approach

<table>
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<tr>
<th>Timing</th>
<th>Weighting</th>
<th>Mixing</th>
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<tr>
<td>Concurrent</td>
<td>Equal</td>
<td>Integrating</td>
</tr>
<tr>
<td>Quantitative first</td>
<td>Quantitative heavy</td>
<td>Connecting</td>
</tr>
<tr>
<td>Qualitative first</td>
<td>Qualitative heavy</td>
<td>Embedding</td>
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For my study, I used the following design, which parallel Creswell’s (2013, p. 209) Sequential Explanatory Design except that I placed more weight on the qualitative data because my quantitative data set was based on a small sample size:

- Timing: Quantitative first
- Weighting: Qualitative heavy
- Mixing: Embedding

I carried out the quantitative research first because I used a pre-and-post survey method to measure the impact of a five-day fieldtrip to the Bamfield Marine Sciences Centre on the environmental attitudes and perspectives of the students. The pre-survey took place nearly two weeks prior to the trip to the Bamfield Marine Sciences Centre in order to minimize the effect that the trip (or, anticipation of the trip) had on the participants’ pre-survey responses. The post-survey took place immediately after the Bamfield trip when the participants were presumably still feeling immersed in and engaged by the experience. The
semi-structured focus groups occurred one week after the Bamfield trip to allow time for the participants to reflect on the experience.

I placed more weight on the qualitative research because my quantitative sample size was relatively small for the survey while my qualitative subsample size was appropriate for semi-structured focus groups (Finch & Lewis, 2003, pp. 192-193). Since the qualitative data hold more weight, I also chose to use the quantitative data as a supporting dataset for the qualitative data. This is characterized by Creswell (2013, p. 208) as embedding. In other words, I used the quantitative data as a triangulation measure for the qualitative data since the qualitative data was more robust and valid.

Study Setting

My study focused on the experiences of my students while attending the Bamfield Marine Sciences Centre (BMSC) in Bamfield, BC. BMSC is located on the west coast of Vancouver Island on the southern shores of Barkley Sound, as seen in Figure 3. Bamfield is a year-round research facility run by five western Canadian universities (the University of British Columbia, Simon Fraser University, the University of Victoria, the University of Calgary, and the University of Alberta). Furthermore, it runs a popular public education program in both the autumn and spring months each year. On-site graduate students and researchers run the program and educate students about various SSIs, including environmental and marine science related topics such as climate change, primary productivity, and intertidal ecology. Moreover, I have visited the location several times.
throughout my life on educational trips and have always held it in high regard for its natural beauty (see Figures 4, 5, and 6) and well-organized and carried out marine science programs (see Figure 7 for itinerary). Thus, I selected this location because it provided students with an excellent opportunity to learn about and take action on environmentally related SSIs in an authentic and culturally relevant setting. As far as I know, there are few other locations in BC that offer a comparable environmental experience for students. Furthermore, BMSC was very supportive of research projects that advocate for environmental and science education.

Figures 4, 5 and 6 are photographs of BMSC that I took while on the trip in April 2016.
Figure 4: Docks at the Bamfield Marine Sciences Centre

Figure 5: Rix building at the Bamfield Marine Sciences Centre
The environmental experience itself, which I refer to as the Bamfield experience from here on, took place over five days, from April 8th to April 12th, 2016. For many students, this was an exciting and unique experience as it was their first time being so far away from their families and urban lives. Many students also described feeling a sense of total immersion in nature, compounded by the long trip to get to Bamfield itself (a trip that includes a ferry across the Salish Sea and an 80km bus ride on a gravel road through an old growth forest).

Students participated in a variety of learning activities through constructivist and experiential learning perspectives that incorporated SSIs throughout the course of the
Bamfield experience, including: boat trips; laboratory investigations; nature walks and beach explorations; lectures; interpretive performances; and student-led round-table style discussions. Furthermore, there is often flexible time between sessions to allow students to reflect on and share stories about the experience. While there is no summative assessment of the content learned in Bamfield, it is an opportunity for students to assess their own beliefs in relation to the content. Figure 7 represents a single day from our itinerary at the BMSC, showcasing wide range of different experiential lessons and activities all focused on marine sciences. The entire itinerary is found in Appendix A.

| Saturday, April 9th (Low tide of 0.2 m @ 08:43; Low tide of 0.7 m @ 20:00) |
|---------------------------------|---------------------------------|---------------------------------|
| 7:30 Breakfast                  |                                 |                                 |
| 8:30 **Group A**: Lab: Primary productivity part 1 (Lower main lab) followed by **Field Trip**: Examination of life on docks and pilings. **Group B**: Lab: Marine invertebrate diversity in Barkley Sound (Whale Lab) |
| 10:30 **Group 1**: Field trip: Ocean sampling aboard the BMSC research vessel Alta (Meet at docks) | **Group 2**: Field trip: Oceanography and coastal biodiversity (Meet at docks) | **Group 3**: Lab: Seaweed ecology, ID, and human uses (Lower Main lab) |
| 12:30 Lunch                     |                                 |                                 |
| 13:30 **Group A**: Field trip: Temperate rainforest ecology (Meet in traffic circle, wear boots) **Group B**: Lab: Seabirds as indicators of ecosystem health (Ross Hall) |
| 15:30 **Group 1**: Field trip: Oceanography and coastal biodiversity (Meet at docks) | **Group 2**: Field trip: Ocean sampling aboard the BMSC research vessel Alta (Meet at docks) | **Group 3**: Field trip: Oceanography and coastal biodiversity (Meet at docks) |
| 18:00 Dinner                   |                                 |                                 |
| 19:00 **Group A**: Lab: Primary productivity part 2 (Lower main lab) **Group B**: Workshop: Climate change grant proposal (Rix A) |
| 21:30 **Group B**: Field trip: Magee teacher-led bioluminescence from the docks |

*Figure 7: BMSC itinerary for April 9th, 2016*
Participants

My study included (N=27) participants, all of who were Biology 11 and/or Chemistry 11 students from Magee Secondary School in Vancouver, BC. The participants were already enrolled in courses with content that is highly relevant to socioscientific issues such as ecology, hydrology, and climate change. Overall, there were twenty female students and seven male students who participated in the study. Within the subsample of fifteen students that took part in the semi-structured focus group interviews, there were twelve females and three males. Twenty-two of the twenty-seven students had some degree of Asian background, with most being second, third, or fourth generation, or culturally mixed Canadians. Thus, only three of the students were not born in Canada, with two of those holding permanent resident status.

The students also represented a wide range of socioeconomic backgrounds, with some students requiring subsidies to attend the field trip. Both the overall study sample and the subsample roughly parallel the cultural and economic demographics of Magee Secondary School. The diversity in the student’s economic background at Magee Secondary School is likely due to the school being open to students from all corners of Vancouver as well as neighboring communities such as Richmond and Burnaby.

In order to recruit the participants, I first had to promote the Bamfield trip. I promoted the trip through a variety of methods at Magee starting in late September of 2015. These methods included public address announcements, posters and photographs from the previous year, informal discussions with students, and announcements within our Biology 11 and Chemistry 11 classes. By November of 2015, I had 34 students who had put their names down as being “definitely interested” in going on the trip. By the end of November, due to a
timing conflict with another school trip, five students had to remove themselves from the list. However, when November 30th came around and the $100.00 deposits were due for each student, I ended up with 29 students who were set to go to Bamfield.

In early March of 2016, after I received approval from the UBC Research Information Services Behavioral Research Ethics Board (BREB), the Vancouver School Board, and the Bamfield Marine Sciences Centre (BMSC), I provided each of the 29 students with an information package about the trip, including an Informed Parent Consent and Informed Student Consent letter for each student that invited each to be participants in my study. These forms are found in Appendix B. After our annual spring break in late March, I had collected 28 of the 29 Informed Parent Consent and Informed Student Consent letters from each student. One other student dropped out of the study after the Bamfield experience, leaving the study with participants. All 27 participants took part in the pre-and-post survey while a subsample of 15 participants took part in the semi-structured focus groups.

Selection of Data Sources

I used two sources of data for this study: a survey to gather quantitative data; and semi-structured focus group to gather qualitative data. I selected a survey because it was cost-effective, time-effective, and allowed my participants to self-report their own responses (Gay, Mills, & Airasian, 2011). I selected semi-structured focus group interviews because I wished to obtain a significant depth of information and use very specific interview questions in order to address my research questions (Gay et al., 2011). I explain how I selected each particular data source below.
Survey

In order to select a survey to explore my research questions, I referred to Gay et al.’s (2011) guidelines for selecting a measurement instrument. These guidelines include both psychometric properties (directly related to the test itself) and non-psychometric properties (externalities that may affect the test’s validity and reliability). Table 5 presents the full list of these guidelines.

Table 5

*Guidelines for selecting a measurement instrument*

<table>
<thead>
<tr>
<th>Psychometric properties</th>
<th>Non-psychometric properties</th>
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<tbody>
<tr>
<td>Validity</td>
<td>Cost</td>
</tr>
<tr>
<td>Reliability</td>
<td>Administrative time</td>
</tr>
<tr>
<td>Length of test</td>
<td>Objections to content by parents or others</td>
</tr>
<tr>
<td>Scoring and score interpretation</td>
<td>Duplication of testing</td>
</tr>
</tbody>
</table>

The measurement instrument that I used is the New Ecological Paradigm (NEP) survey (Appendix C), designed to understand people’s underlying environmental worldviews (Anderson, 2012, pp. 260-262; Dunlap & Van Liere, 1978; Dunlap & Van Liere, 2008; Dunlap, Van Liere, Mertig, & Jones, 2000) to assess change in the participants’ environmental attitudes. I will now justify why I selected the NEP survey based on Gay et al.’s (2011) guidelines, starting with psychometric properties, then with non-psychometric properties.

The New Environmental Paradigm (also referred to as NEP in the literature; throughout my thesis, I refer to NEP as the New Ecological Paradigm), was designed by
Dunlap and Van Liere (1978) specifically to measure whether a population was moving away from their dominant social paradigm (i.e., anthropocentric) towards a more pro-environmental worldview (i.e., biocentric or ecocentric).

According to Anderson (2012), Dunlap (2008) and Hawcroft and Milfont (2010), the NEP survey is both valid and reliable as it is internally consistent and has measures a single scale. As a result, the NEP survey may now be the most popular and accepted measurement of environmental values, attitudes, or worldviews (Anderson, 2012; Dunlap, 2008).

The NEP survey has 15 items in total that each offers a statement about an environmental concept, as seen in Figure 8. Participants rate each statement on a Likert-scale with five values ranging from numerals one to five, where one is strongly disagree, two is disagree, three is not sure/neutral, four is agree, and five is strongly agree. Using an instrument scale with an odd number of values is beneficial as it allows for participants to take a neutral position on the item (Callero, 1992). Value-wise, the seven even numbered statements are categorized as a reflection of the “dominant social paradigm” and the eight odd numbered statements reflect an endorsement of the “new environmental paradigm” (Dunlap & Van Liere, 2008).

To score the NEP survey, the data collector totals the number of agreeable responses from each participant for the odd numbered statements and the even numbered statements. Participants who agree with all seven odd numbered statements (i.e., rank the statement as a four or five) exhibit a pro-environmental worldview while participants who agree with all eight numbered statements exhibit a pro-dominant social paradigm worldview.
Figure 8: New Ecological Paradigm Scale

There has been criticism of previous versions of the NEP survey (Anderson, 2012; Hawcroft & Milfont, 2010; Lalonde & Jackson, 2002). The New Environmental Paradigm survey (also represented in the literature as NEP; to differentiate between the two, I use NEP solely as the acronym for New Ecological Paradigm) was critiqued for a lack of internal
consistency, exhibited a low correlation between the survey measurement and actual behaviour, and contained terms that were no longer relevant (Anderson, 2012; Lalonde & Jackson, 2002). Criticism has also been directed at the NEP survey itself, in that it may not represent all elements of pro-environmental worldviews, specifically, it leaves out biocentric or ecocentric worldviews (Anderson, 2012). Moreover, when comparing between groups, Hawcroft and Milfont (2010) utilized weighted regression analysis in showing that the NEP survey responses varied between sample types, which affects its ability to draw comparison between two groups. Lastly, some researchers have challenged the claim that the NEP survey measures only a single scale. When analyzed using principal component analysis, NEP survey has shown to measure up to three different dimensions, thus questioning its ability to measure what it intends to measure and decreasing its validity (Anderson, 2012). While the criticisms may seem to contradict prior claims, the NEP is considered the most valid instrument to measure environmental values, attitudes, and worldviews (Anderson, 2012).

Therefore, the NEP survey was appropriate for my study, as I was not testing for any particular pro-environmental worldviews, nor comparing scores between two groups, but rather investigating whether there was a shift in any type of environmental worldviews amongst my participants before and after the Bamfield experience. Therefore, amongst the affective instruments available, NEP survey seemed best suited to answer my research questions.

Semi-Structured Focus Group

In addition to the survey, I was looking to generate more in-depth information in order to fully answer my research questions. According to Ritchie, Lewis, Nicholls, and Ormston (2013, pp. 56-57), generated data collection methods such as focus groups and in-
depth interviews are appropriate in cases where the researcher is aiming to extract participants’ meanings and interpretations of an experience. Since my research question focuses on the nature of my participants’ experience, I opted for generated data collection over naturally occurring data.

Ritchie et al. (2013, pp. 57-60) describe three factors that should be considered when choosing between focus groups and in-depth interviews:

1. The nature of the data sought
2. The subject matter of the data
3. The research population

Based on the nature of the data that I was looking to obtain for my study, I chose to use three focus groups. According to Ritchie et al. (2013, p. 58), focus groups are particularly useful when investigating participants’ attitudes as the social and collaborative nature of the interviews allows participants to bounce their own ideas, perspectives and attitudes off those of the others in the interview. As a result, it is possible to compare different perspectives and attitudes within groups through the data collected, thus painting a more complete picture of the experience that they shared. While Ritchie et al. (2013, pp. 58-59) recommend in-depth interviews as the best method for gathering information on complex experiences and the impacts they have, they also recommend focus groups when the subjects are somewhat intangible or abstract and when the participants all share a commonality. Therefore, I opted to use the focus groups in the interest of having participants work together to compare and contrast their experiences, especially in light of the abstract and metacognitive nature of the questions that were asked regarding their experiences. Moreover, my research population consisted of participants who all were members of the Bamfield experience as well as...
members of the Magee school community; thus, they had a commonality while still representing a diverse set of perspectives.

I chose to use a semi-structured interview format for my focus groups. This allowed me to ask a set of pre-determined questions while still having the ability to probe deeper with supplementary questions that arise from the participants descriptions of their perspectives, as suggested by Arthur and Nazroo (2003, p. 111). I asked each focus group a series of eight questions that I adapted from Ballantyne et al. (2010). I adapted the questions to investigate the students’ attitudes and perspectives about the environment based on the Bamfield experience in particular. The eight questions I asked each focus group (also found in Appendix D) were:

1. How did you enjoy your field trip last week? What key things stick in your mind from your experiences at Bamfield?
2. How did you find the activities we did while on the trip? Were they engaging? Did they help you learn the content?
3. Have you reflected on your experience in Bamfield since you returned? If so, could you provide detail?
4. While in Bamfield, how did you view yourself in relation to the environment around you?
5. What have you learned about your own beliefs while in Bamfield?
6. Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment?
7. If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change?
8. Can you tell me the most important thing that you’ve told me today?
One critique of this method when using focus groups is that it often leads to the most articulate or confident participants dominating the discussion (Arthur & Nazroo, 2003, pp. 111-112). However, I followed the recommendations of Finch and Lewis (2003, pp. 182-184) to ensure I controlled the balance among contributors by using non-verbal cues such as eye contact, a rotation of speakers, and using verbal interventions when necessary.

I also referred to Finch and Lewis’s (2003, pp. 190-193) guidelines to generate the groups in terms of the group size and composition. Since I was working around the participants’ busy schedules, I was limited in my ability to influence the composition of the group. However, all of my groups were relatively heterogeneous in their perspectives while homogenous enough to avoid conflict based on their different perspectives. Regarding group size, I had between three and six participants in each group. While this may be considered to be on the smaller end of group sizes suggested by Finch and Lewis (2003, pp. 192-193), it was how the scheduling worked for the groups and was effective in the end.

I roughly followed the group processes suggested by Finch and Lewis (2003, p. 174) based on Tuckman and Jensen’s (1977) stages of small group development. These stages are outlined in Table 6.

Table 6

*Stages of Group Development*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forming</td>
<td>Participant introductions, collection of background information</td>
</tr>
<tr>
<td>Storming</td>
<td>Intragroup tension and conflict amongst participants</td>
</tr>
<tr>
<td>Norming</td>
<td>Calming phase of sharing, settlement, and agreement</td>
</tr>
<tr>
<td>Performing</td>
<td>Participants engaging in open discussion on the research issues</td>
</tr>
<tr>
<td>Adjourning</td>
<td>Participants and researchers end the session</td>
</tr>
</tbody>
</table>
I made some adaptations to the process due to the nature of my participants groups. For example, my forming, storming and norming stages were limited as the participants had already established relationships and knew one another as members of the same school and classes. Furthermore, there was little tension or conflict amongst the participants. The performing stage took the lion’s share of the time of each focus group. While Finch and Lewis (2003, p. 192) warn that there is concern in having pre-existing groups share their experiences together in focus groups as they may not elaborate on their common experiences and assumptions, the semi-structured format of the focus groups allowed me to probe further when this occurred.

Data Collection

Prior to collecting data through both the survey and semi-structured focus groups, I referred to the data collection procedures for mixed methods studies outlined by Creswell (2013, pp. 217-218). The first step was to identify the type and nature of the data that I would be collecting through my data sources. In this case, I would be selecting quantitative data from my pre-and-post surveys and qualitative descriptive data from the semi-structured focus groups. Secondly, while Creswell (2013, p. 217) suggests using a randomized sample of participants for the quantitative research and a purposeful sample of participants in qualitative research, I actually reversed this procedure since all my participants had taken part in the Bamfield experience and I did not want to influence the outcome of my qualitative data by hand-selecting the qualitative sample. Thus, I had all participants take the pre-and-post surveys and had a randomized subsample of participants take part in the semi-structured
focus groups. Below, I describe the specific processes of collecting data that I employed for both my quantitative and qualitative research.

Quantitative Data Collection

I collected quantitative data twice via the NEP survey (Dunlap & Van Liere, 2008); once prior to the Bamfield experience and once after the Bamfield experience. All of the Magee Secondary students attending the Bamfield trip in April 2016 were invited to take part in the study via Informed Parent Consent and Informed Student Consent letters (Appendix B) handed out during a meeting on March 11th 2016. Of the 29 students who were invited to take part in the study, 28 returned their Informed Parental Consent and Informed Student Consent forms by the deadline on March 29th 2016. Prior to the pre-trip survey, I randomly assigned each participant a different number between one and twenty-eight in order to minimize externalities and to use solely for tracking purposes. The pre-trip survey took place on March 29th 2016. The data were collected and analyzed using Statistical Package for Social Scientists (SPSS) version 22 (IBM, 2015).

Immediately following the Bamfield experience on April 12th 2016, the same 28 participants were invited to take part in completing the post-trip survey. I distributed the surveys via the same randomized numbers assigned to each participant prior to the pre-trip survey so that I was able to compare the results before and after the experience. As described earlier, one participant withdrew from the study at this stage, resulting in a total of 27 participants. The data from the post-trip survey were collected and analyzed using SPSS version 22 (IBM, 2015). The results of the pre-trip and post-trip surveys are presented Chapter 4.
Qualitative Data Collection

After the Bamfield experience, I used semi-structured focus groups to collect my qualitative data. I conducted three semi-structured focus groups with a total of 15 participants in groups ranging from three to six participants. I conducted three focus groups in order to provide an appropriate time for each participant. The 15 participants were randomly selected from the 27 participants who took part in the study using Microsoft Excel’s random sample feature, where each individual had the same probability of being chosen for the focus groups. In following with this procedure of selecting the focus group participants, my data from the focus groups is more likely to represent the entire sample of participants (Creswell, 2013, p. 217). The eight semi-structured questions (Appendix D) were used to probe students’ depth of knowledge and understanding about environmental issues and problems while simultaneously engaging them in reflective and meaningful discourse. The three focus groups took place in the afternoon of Tuesday, April 26th 2016 and morning and afternoon of Thursday April 28th 2016. The focus groups were audio recorded and their dialogue was transcribed. I had each participant look over the transcriptions to ensure that I had captured their true perspectives. I limited how much I paraphrased and altered the transcriptions, with most edits focused on removing irrelevant banter (i.e., on one occasion, another student entered the room while we were recording). Furthermore, as suggested by Ritchie, Spencer, and O’Connor (2003, p. 229), I included as much of each participants’ language, including the “umms,” “errs,” and “likes” as they represented their thought processes which I believe were helpful in analyzing their responses. Nonetheless, if my researcher bias influenced or limited the transcription in any way, it was likely only through subtraction and not due to any
sort of addition or falsified data. The results of the semi-structured focus groups are presented in Chapter 4.

Lastly, as suggested by Merriam (1998), I kept written notes of my own observations and experiences throughout the entire research process in a journal to maintain an “on the spot record” of both the participants’ and my own experiences (Hatch, 2002, p. 88). I also documented the participants’ behaviour, engagement in activities and their responses to field experiences in order to best understand their perspectives. A summary of the data collection timeline is presented in Table 7.

Table 7

<table>
<thead>
<tr>
<th>Task</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-trip survey</td>
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<tr>
<td>Bamfield trip</td>
<td>Early April 2016</td>
</tr>
<tr>
<td>Post-trip survey</td>
<td>Mid-April 2016</td>
</tr>
<tr>
<td>Semi-structured focus groups</td>
<td>Late April 2016</td>
</tr>
</tbody>
</table>

Data Analysis

While collecting data, I was also continually analyzing it, as suggested by Merriam (1998, p. 14). This allowed me to continually understand and interpret the data as it developed, as well as providing direction for me to further probe interesting research avenues. Below, I outline how I analyzed the quantitative and qualitative research data.

Quantitative Data Analysis

I used the statistical software SPSS version 22 (IBM, 2015) to perform descriptive analysis and T-Test to determine whether there was any impact on the students as a whole as
a result of the Bamfield experience. I then used the same software to identify the most
dominant components at entry into the programme and tracked them over time.

Qualitative Data Analysis

The interviews were recorded and transcribed. The interview data were then carefully
examined and categorized using a thematic approach (Merriam, 1998; Miles & Huberman,
1994) to address the study objectives and research questions (Miles & Huberman, 1994; Yin,
2013). Using an “indexing” approach to tag and label my data as described by Ritchie et al.
(2003, pp. 224-225), I discerned three major themes that emerged from the semi-structured
focus groups that related directly to my research questions.

Ethical Considerations

I obtained approval to conduct this research from the UBC Research Information
Services Behavioral Research Ethics Board (BREB), the Vancouver School Board, and the
BMSC. In accordance with BREB procedures, all participants received “Informed Parental
Consent” and “Informed Student Consent” letters outlining the principle investigator(s) and
the conditions for participating in and withdrawing from the study (see Appendix B). To
ensure anonymity and to maintain privacy and confidentiality, pseudonyms are used for all
participants. All data are stored on a password-protected computer and documents stored in a
locked file cabinet. After five years, all data including identities and personal information of
the participants will be erased.

Participation was entirely voluntary and students had the opportunity to withdraw
from participation at any point in the research without any required notice or reason and
without penalty. All students were required to provide personal consent and parental consent for their participation.

Study Validity and Reliability

In order to increase the validity and credibility of my study, I triangulated multiple data sources as suggested by Mathison (1988). The data in my study came from one survey employed on two occasions (pre-and-post Bamfield experience) as well as follow up semi-structured focus groups. Additional data sources included research field notes and photographs of the students’ engaged in programme activities. These data sources further supported the interview and survey data and also provided me with a recall of events as I analyzed the data.

In order to establish reliability, I employed a dialogic reliability check multiple times throughout the study, as described by Åkerlind (2012). This was done by regularly communicating my interpretation of the data with the members of my supervisory committee in order to establish a consensus regarding the interpretation of the data.

Throughout the study, I emphasized my status as a researcher. It was made clear to all the participants in both the Informed Parental Consent and Informed Student Consent documents (Appendix B) that they were free to withdraw from the study at any time without providing reason or incurring any kind of penalty e.g. their grade. Nonetheless, there was a possibility of the Hawthorne Effect influencing the students’ behaviour in my study. The Hawthorne Effect occurs when participants in a study alter their behaviour and/or responses as a result of their awareness of participating in a study. In studies where the practitioner is involved in the inquiry, the Hawthorne Effect is unavoidable (Schön, 1983, p. 322).
Therefore, in my particular study, I was wary that the students might alter their responses as a result of my presence as a researcher and as their teacher. To lessen the influence that I, as their teacher, had on the students during this study, there were no marks provided throughout the Bamfield experience, and had other teachers help to invigilate the pre-and-post NEP surveys. According to Steele-Johnson, Beauregard, Hoover, and Schmidt (2000), the Hawthorne Effect is minimal in studies where feedback is not given. Lastly, I attempted to take the perspective of “empathic neutrality”, where I recognized that my beliefs and perspectives would be influential in analyzing the data, and made judgments from as neutral of a stance as possible, as suggested by Ritchie et al. (2013).

Study Limitations

Conducting my research with my own students as participants likely comes with unavoidable limitations and preconceptions. While the participants may have been influenced by their familiarity with my teaching style and environmental interests, I made sure to stay as objective, neutral, and unbiased as possible throughout the study.

Additionally, being a white male of middle socioeconomic background may have limited my ability to understand the true nature of the students’ perceptions and/or attitudes. Furthermore, my background as a biologist and conservationist predisposes me to a pro-environment worldview that may have limited my ability to empathize with or properly identify dominant-social paradigm or anti-environmental worldviews. Lastly, my anecdotally supported belief that environmental experiences do lead to development of pro-environmental attitudes may have been a major limitation in my research.
It was also important for me to be aware of the mechanisms by which students learn. Many authors vaguely paraphrase (or incorrectly directly cite) Dewey (1936) in suggesting that experiences themselves are not the cause of student learning; rather, the reflection and metacognitive thought upon these experiences are the cause of student learning (Anderson & Nashon, 2007; Ballantyne et al., 2010). Thus, if students do show evidence of learning (in my study’s case, a change in their attitudes regarding the environment), they may have also reflected on their experience in some capacity.

Limiting factors of my study included the possibility that study participants might have already had pro-environment worldviews, perceptions, and/or attitudes. I was keenly interested to see any sort of shift in those who do not already have pro-environment attitudes, or if there is a negative shift in their attitudes as a result of the study.

Chapter Summary

This research study focused on investigating the impact of an environmental experience on BC science students’ attitudes about the environment. To answer these questions, I conducted a mixed-methods research study. My quantitative component was administering the NEP survey before and after the Bamfield experience. My qualitative component was the conducting of semi-structured focus groups after the Bamfield experience to collect data on the students’ depth of knowledge and understanding about environmental issues and problems.
CHAPTER 4: Study Findings and Analysis

In this chapter, I report the findings and provide an analysis of the study data in order to address my research questions:

1. What is the impact of an environmental experience on the environmental attitudes of BC science students?
2. How have the environmental attitudes of BC science students shifted as a result of the environmental experience, as measured by both quantitative and qualitative methods? (i.e., are they more or less pro-environmental)
3. What facets of the environmental experience might have led to change(s) in the environmental attitudes of BC science students?

Following completion of the pre-trip NEP survey and the environmental experience in Bamfield, 27 participants completed the post-trip NEP survey (Appendix C). The surveys enabled me to investigate whether there was any statistically significant shift in their environmental attitudes and to measure such a shift if it exists. The in-depth results of this survey are discussed below in the section titled Quantitative Data and are best applied as a triangulation of the qualitative data.

A randomized subsample of the participants (N=15) then took part in the semi-structured focus group interviews to collect qualitative data. The participants were provided with a set of eight questions with the intention of drawing out their most sincere personal interpretations, reflections, and descriptions of their experiences in Bamfield (Appendix E). The interviews were recorded, transcribed, and matched with participants’ pseudonyms. The transcriptions of the focus groups are provided in Appendix E.
Once the interviews were transcribed, I carefully analyzed and categorized the participants’ responses thematically to address my research questions. Three major themes of the qualitative data emerged from the semi-structured focus group interviews: (1) strengthened environmental beliefs; (2) shifting view of their connection with nature; and (3) preference for environmental and experiential learning. These themes are discussed in depth in the section titled Qualitative Data.

Quantitative Data

In order to investigate whether the Bamfield experience had any impact on the participants’ attitudes and perspectives about the environment, I collected quantitative data using pre-and-post trip NEP surveys that bookended the Bamfield experience. Once the data were collected, I performed Descriptive Statistics as well as T-Tests in order to analyze the quantitative results.

Through analyzing the data using descriptive statistics, the findings indicated that participants as a whole could be described as possessing pro-environmental worldviews. This was the case both before and after the Bamfield experience. Table 9 summarizes the Descriptive Statistics results of my study. To investigate whether the participants’ pro-environmental worldviews increased or decreased as a result of the Bamfield experience, I employed a One-Sample T-Test. Table 10 summarizes the One-Sample T-Test results of my study.
Table 9

Descriptive statistics results

<table>
<thead>
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<th>Question</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td>3</td>
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<td>4.57</td>
<td>.602</td>
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</tbody>
</table>

Valid N (listwise) 54
Based on both results of my quantitative analysis, participants showed a statistically significant shift ($p=.000$) in their environmental attitudes, indicating that the Bamfield experience did indeed have an impact on the BC secondary science students’ environmental attitudes. However, my small quantitative sample size ($N=27$) made it difficult to statistically validate the findings. Nonetheless, when the pre-and-post NEP survey results were triangulated with the qualitative data, I was able to discern that the students did indeed undergo a change towards a more pro-environmental attitude as a result of the Bamfield experience. I will now describe this further in the section titled Qualitative Data below.

Table 10

One-sample T-Test results

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
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<th>Lower</th>
<th>Upper</th>
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</table>
Qualitative Data

While the quantitative data indicated that the participants did undergo a shift in their environmental attitudes, it was important for me to understand and further describe this shift. Therefore, to further investigate the impact the Bamfield experience had on the participants, I employed semi-structured focus groups. The findings associated with the qualitative research consist of three key themes that emerged through discernment of the data collected through the semi-structured focus groups. The three key themes were all related to the concept of *environmental beliefs*. In the first theme, participants described their strengthened beliefs about the environment, as discussed in Finding One: Strengthened Beliefs below. A second theme of the findings is focused on how participants described their connections to nature as a result of their environmental beliefs, discussed in Finding Two: Connection to Nature. The third theme, discussed in Finding Three: Learning Preferences is focused on the participants’ perspectives on experiential learning and how this kind of learning helps foster their environmental beliefs.

Since all three themes are related to environmental beliefs, it is important to define what I mean by this concept. Environmental beliefs are associated with three key terms, environmental concerns, environmental attitudes, and environmental worldviews (Dunlap & Jones, 2002a; Dunlap & Jones, 2002b; Fransson & Gärling, 1999; Schultz et al., 2005; Schultz & Zelezny, 2003). Environmental concerns are the emotional affects one has *for* the environment and related issues. Environmental attitudes are the beliefs, intentions, and feelings one has *about* the environment and its related issues, implying that environmental concerns are an underlying aspect of environmental attitudes. Lastly, environmental
worldviews are the beliefs that humans have regarding their relatedness with nature (Schultz et al., 2005).

Finding One: Strengthened Beliefs

Pro-environmental beliefs are related to a set of environmental attitudes and, more specifically, environmental concerns that one has regarding the environment (Bruni et al., 2012; Schultz et al., 2005; Schultz, Shriver, Tabanico, & Khazian, 2004). Three types of environmental concerns have been identified and described by Stern and Dietz (1994), and further clarified by Schultz et al. (2005). Egoistic environmental concerns are focused on the implications of environmental issues upon oneself. Social-altruistic environmental concerns are similar, but focus on humanity as a whole. Biospheric environmental concerns are focused not just on humanity, but on the wellbeing of all living things equally (Schultz et al., 2005; Stern & Dietz, 1994).

Through the semi-structured focus group interviews, many participants identified themselves as having pro-environmental beliefs prior to the Bamfield experience. However, participants also discussed how their pro-environmental beliefs became strengthened as a result of the Bamfield experience. This idea supports research from Kals, Schumacher, and Montada (1999) suggesting that positive past or present environmental experiences may be the source of one’s environmental concern. It is important to note that term ‘strengthened’ and its synonyms may mean different levels of change for each participant, ranging from no change at all to a significant change (i.e., change from one type of environmental concern to another).

Specifically, participants were asked a number of questions that implicitly or explicitly probed their environmental beliefs following the Bamfield experience, including:
• What have you learned about your own beliefs while in Bamfield? (Q5, Appendix D)

• Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment? (Q6, Appendix D)

• If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change? (Q7, Appendix D)

For example, when asked what she had learned about her own beliefs as a result of the Bamfield trip (Q5, Appendix D), Elise discussed how the trip strengthened her belief that pro-environmental behaviours (such as living a ‘minimalistic lifestyle’) are important if one is to influence positive change for the betterment of the environment and world:

Before I went to Bamfield, my sister and I kept talking about living a minimalistic lifestyle. But like, we never got around to it because we still live with our parents and thought it wouldn’t work out. But after going to Bamfield, it strengthened my belief that living minimally can actually make a difference because you’re not exploiting as many resources and you actually think about the mark that you’re making on the world (Elise, Focus Group Interview, April 26, 2016).

Of note is that Elise’s pre-and post-trip NEP scores were amongst the most pro-environmental of all the participants. This result is interesting because it indicates that even those with strong pro-environmental beliefs can experience a strengthening in these beliefs as a result of an environmental experience. Many of the participants who exhibited pro-environmental NEP scores both before and after the Bamfield experience seemed to corroborate this notion. For example, Dakota implies how Bamfield further justified her pro-environmental beliefs:
I already like was informed about how bad it was. In our leaders program here [at our school], we talked about it a lot and we did a huge project on it so I knew it like was already super-super bad. So like, going to Bamfield just further proved it (Dakota, Focus Group Interview, April 28, 2016).

Another participant, Erica, explicitly states how Bamfield strengthened her pro-environmental beliefs, “My belief for protecting the environment, I guess it made it more stronger.” And participant, Samantha, expands on the sentiments provided by Dakota and Erica, explaining why she felt that the Bamfield experience helped foster her pro-environmental beliefs:

Going to Bamfield, it made me realize just how important saving the whole Earth is. And, I guess my beliefs did change, even before going to Bamfield, because the more you know, the more awareness you gain and makes you really want to do something (Samantha, Focus Group Interview, April 26, 2016).

Lastly, in implying why the Bamfield experience may develop pro-environmental beliefs, Landon draws a comparison between those who live in the city (as all the participants in this study do) and those who are able to spend more time in nature, such as those who reside in a place such as Bamfield:

I think that a lot of people who live in the city don’t usually get out much because they work in the city, they live in the city, and you don’t really get to see anything outside of the city. But if you do get the experience to go and look outside of the city and just see nature and like, the forest and the sea, it kinda opens your eyes (Landon, Focus Group Interview, April 28, 2016).
Interestingly, these comments indicate a clear need for more qualitative research within this field as it provides an opportunity to learn about the potential beliefs that may exist beyond the limitations of a quantitative measure such as the NEP survey (Dunlap & Van Liere, 2008).

In response to the same question (Q5, Appendix D), both Karina and Caroline also suggested that the experience of being in Bamfield was the underlying reason for a strengthening in their already pro-environmental beliefs – again, supporting research from Kals (1999). However, they also presented an opinion that humans should take action as a result of their pro-environmental beliefs. For example, Karina explains:

I think seeing Bamfield and going into like, nature and the wild, it like…it like strengthened my belief that we need to change like the planet for the good. Climate change, and all that, like reduce the emission of greenhouse gases (Karina, Focus Group Interview, April 28, 2016).

Another participant, Caroline, echoes Karina’s statement that humans need to make changes in their relationship and use of the environment, and that this belief stems from a strengthened pro-environmental belief as a result of Bamfield:

But I guess being there [Bamfield], because it’s so different from the city, like where you stay and where you eat, I don’t know, I guess it strengthens the belief… that humans are like… should change how they treat the environment (Caroline, Focus Group Interview, April 28, 2016).

Karina and Caroline both imply that it is through environmental experiences such as a trip to Bamfield where such beliefs are strengthened. This notion also parallels research suggesting that learning about the environment within a natural setting allows students to develop a
better understanding of the environment as their senses are fully engaged in the experience (Koutsoukos, Fragoulis, & Valkanos, 2015; Markaki, 2014).

When asked what specific factors about the Bamfield experience might have led to the strengthening of her beliefs about the environment (Q6, Appendix D), Elise suggested it was the entirety of the experience that really scaffolded the shift in her beliefs – or, so to say, the experience is a gestalt that is not easily defined by its individual parts:

I think the whole experience, like being in nature and being able to study in nature, the bioluminescence, the stars, like, it all changed, it all played a part in changing how I thought about the environment. Because, I feel like I have a new respect and appreciation for the environment (Elise, Focus Group Interview, April 26, 2016).

This suggests that environmental experiences are more than a simple collection of activities that can be individually assessed or evaluated. Instead, there could be an overarching and indivisible richness associated with the experience of being in nature, a notion that aligns with Naess’ (1973) concept of deep ecology: humans are interconnected with all of nature, and thus share the same level of significance and importance as everything else in nature.

While many of the participants echoed the understanding that their pro-environmental beliefs strengthened as a result of the Bamfield experience, Samantha goes one step further in explaining why pro-environmental beliefs are important (Q6, Appendix D):

[A]fter going to Bamfield, you really, I guess, you really understand why you know, protecting the environment is so important. We basically rely on it, and if we can’t fix our ways or even convert it to being more sustainable, there’s no way that we can survive if we all… there’s billions of us, and every day, there’s only like so much
damage one person can do. And if we don’t fix our ways, we’re pretty screwed (Samantha, Focus Group Interview, April 26, 2016).

Samantha describes her environmental concern as the reason for why pro-environmental beliefs are important. Furthermore, Samantha describes a level of self-transcendence and interdependency that is characteristic of biospheric environmental concerns (Schultz et al., 2005). Furthermore, the interdependent relationship one has with the environment, as described by Samantha, suggests evidence of a connection to nature. This supports research from Nisbet, Zelenski, and Murphy (2009) suggesting that pro-environmental beliefs are related to a sense of connectivity to nature.

Finding Two – Connection to Nature

Another related theme that emerged from the semi-structured focus group interviews is how the participants described their relationship with nature. Specifically, many participants described how the trip to Bamfield changed the way they viewed themselves in nature, as well as the degree to which they felt concern for the environment. Research by Nisbet et al. (2009) suggests that a correlation exists between those who exhibit pro-environmental beliefs and those who feel strongly connected to nature. This correlation is further described in research by Schultz et al. (2004) that suggests that the degree of concern one has for the environment is directly related to their implicit sense of connectivity in nature.

Furthermore, as suggested by Kals et al. (1999), positive past or present environmental experiences may be the cause for a strong feeling of connectivity with the nature. This sense and understanding of inter-connectivity and interdependence with nature, described by Naess (1973) as one’s ecological self, implies a significant level of
environmental concern, where one views the wellbeing of the environment as equal to their own wellbeing (Nisbet et al., 2009), which is consistent with the description by Schultz et al. (2005) of a biospheric attitude. Thus, if one feels a sense of connectivity with nature - perhaps as a result of a positive environmental experience - then they may exhibit a level of environmental concern, and ultimately possess pro-environmental beliefs, worldviews, and/or attitudes.

The participants’ descriptions of how the Bamfield experience affected their relationship with nature varied among students. Most participants were explicit or implicit in how they described of their sense of connectivity, belongingness and/or humility within nature while in Bamfield. Some participants mentioned to me that they found themselves speechless, yet their emotion and tone when speaking with me implied a clear reverence for nature. Based on my analysis, there was no case where a participant explicitly or implicitly felt less connected to the environment or nature.

The specific questions that either explicitly or implicitly evoked the descriptions of how participants viewed their connection to nature included:

• While in Bamfield, how did you view yourself in relation to the environment around you? (Q4, Appendix D)
• What have you learned about your own beliefs while in Bamfield? (Q5, Appendix D)
• Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment? (Q6, Appendix D)
• If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change? (Q7, Appendix D)
Can you tell me the most important thing that you’ve told me today? (Q8, Appendix D)

In discussing how they viewed themselves in relation to the environment (Q4, Appendix D), some participants explicitly described themselves feeling connected to, humble within, and ultimately, belonging in nature, revealing their biospheric attitudes and ecological selves. For example, Megan describes how she felt “smaller” while in nature, but this feeling allowed her to realize how connected we are to nature:

Hmm… I guess smaller, but also more connected. Like, we are more connected to the environment than what we think we are, in a society where we are surrounded by like, buildings and so influenced by money. Hmm… it made me realize that there is so much more to nature and life. Yeah, we are just… more connected to nature (Megan, Focus Group Interview, April 26, 2016).

A number of other participants, including Elise, Erica, and Carlos, also revealed their ecological selves as they shared the same sentiment of feeling “smaller” but more connected as well. Furthermore, they also implicitly or explicitly described their sense of concern for the environment (in this case, consistent with a biospheric attitude), which supports research suggesting that one’s sense of connectivity within the environment is linked with their sense of concern for the environment (Kals et al., 1999; Nisbet et al., 2009; Schultz et al., 2005; Schultz et al., 2004). For example, Elise describes how the Bamfield experience was the cause of her revelation that everything on this planet is connected, and that while we may be “insignificant”, we are also “really important”:

I felt insignificant, but also like, really important at the same time. We’re all in this together, all the species and organisms – everything on this planet is connected in
some way. Like, when we’re gazing at the stars, even though we feel that we’re so great and people are fighting for power, we think this world revolves around us but it doesn’t. This trip made me realize that (Elise, Focus Group Interview, April 26, 2016).

Erica echoed Elise’s revelation that while we may be small compared to the environment, we are still a part of it:

I think I felt like, part of nature in some sense … you kinda feel like you’re part of nature but you don’t actually know what you are. Because, it’s so big! And then, yet, you’re so small, then you care about yourself so much and you’re so selfish, and you don’t really care about anything other there. So yeah, I would say, a part of nature (Erica, Focus Group Interview, April 26, 2016).

Carlos further exemplifies the humility of Erica and Elise as he discusses why this mindset is important for us as humans:

It was a very humbling experience to realize that “Oh, you’re just another species in the food chain, like, nothing special.” Humans always forget that. I think it’s very important for everyone to just like, go outside to see what the world was like for the past four billion years. Like, when I was watching the stars… like, whenever I see the stars, it reminds me just like, how small we are. This world is just another speck of dust in the universe. And this mindset is really important (Carlos, Focus Group Interview, April 28, 2016).

The participants’ descriptions of feeling an increased sense of connectivity in nature are aligned with their shift towards pro-environmental beliefs, attitudes, and concerns. According to Naess (1973), this indicates that the students possess a deep ecological
worldview where nature is no less significant than oneself. While my methodology did not include a quantitative measure for a deep ecological worldview (the Nature Relatedness scale as described by Nisbet et al. (2009) may be appropriate for this), the qualitative descriptions provided through the semi-structured focus group interviews revealed a strong indication that participants may possess a deep ecological worldview.

In reflecting on the potential that the participants may have developed a deep ecological worldview as a result of the Bamfield experience, it became evident to me that participants may have experienced a degree of conceptual change. Conceptual change is a central theme within science education literature, originally described by Posner et al. (1982) and based on Kuhn (1966) paradigm shifts and Piaget (1964) work on cognitive development through constructivism. Conceptual change is described as a shift in one’s understanding about a subject, where new conceptions replace older and less refined conceptions about a particular subject. Two forms of conceptual change are recognized by Posner et al. (1982), assimilation and accommodation. Assimilation is defined as a conceptual change where the new conception fits into the existing paradigms or worldviews one has about the subject. Accommodation, on the other hand, occurs when one’s existing paradigm or worldview clashes with the new conception, requiring a new paradigm or worldview altogether.

While my research questions were not designed to describe the exact type of conceptual change that occurred, I believe assimilation was the predominant form of conceptual change experienced by the participants as they already had pro-environmental beliefs prior to the Bamfield experience (Posner et al., 1982). For example, Megan shows evidence of assimilation in her description of how Bamfield not only made her feel more
connected to the environment, but helped refine her conception of why marine organisms are important for the environment:

For me, before when we were learning about sea stars, I was like “Okay, whatever, I can see them in Nemo and don’t really care about them.” In Bamfield, I got to see them and like, touch them and see them move and that was really cool. Looking at all the animals we don’t see everyday and how important they are. Hmm, like, the environment, how important it is to us, we need to start making a difference in the world. It just made me feel much more connected to the environment. I felt much closer to nature (Megan, Focus Group Interview, April 26, 2016).

Another example of assimilation is evident in how Chloe describes her shifting sense of connectivity to nature in response to Q7 (Appendix D):

Being at Bamfield, it just… it really humbled me I guess, and it made me kind of view the world in a way where humans aren’t the most important. Umm, and after coming back, every time I look at a bee, or a snail, or any other small creature that’s like… so many times smaller than us, I think and… I look at them and think “Wow, humans are really insignificant as like, as a species.” … And that maybe sometimes, we can just reflect on our actions and think about our little actions as something big that will affect the world, and that might cause change in some people, and that change could be good. Or it could be bad, but at least there’s change (Chloe, Focus Group Interview, April 26, 2016).

The apparent evidence of conceptual change through assimilation as a result of this sort of experience suggest that future research in this area may be worthwhile, especially in an environmental education and science context.
Overall, the evidence strongly suggests that the Bamfield experience may have been capable of fostering a strong sense of connectivity to nature amongst the participants. However, it still remains to be examined which factors associated with the Bamfield experience were responsible for strengthening participants’ pro-environmental beliefs and increased sense of connectivity with nature. Based on the qualitative data, I believe there are two concepts related to experiential learning that may provide such an explanation: (1) the metacognitive aspect of experiential learning as described by Anderson and Nashon (2007) and Nielsen et al. (2009); and (2) the sense of belongingness associated with being in nature, as described by Naess (1973), Naess and Rothenberg (1990), and Gurholt (2014).

Finding Three – Learning Preferences

In the semi-structured focus groups, the participants provided key insights into why the Bamfield experience was so powerful in helping them to feel a strong sense of connectivity with nature and develop stronger pro-environmental beliefs. Thus, the third major theme of the qualitative data is focused on experiential learning and the underlying reasons why participants developed such perspectives. Two key concepts stand out as influencing the development of these perspectives: (1) the metacognitive learning that takes place as a result of experiential education, as described by Anderson and Nashon (2007) and Nielsen et al. (2009); and (2) the sense of belongingness, happiness, and engagement that one has from learning out in nature, as described by Naess (1973), Naess and Rothenberg (1990), and Gurholt (2014).

The specific questions that implicitly or explicitly elicited participant perspectives about experiential learning include:
• How did you enjoy your field trip last week? What key things stick in your mind from your experiences at Bamfield? (Q1, Appendix D)

• How did you find the activities we did while on the trip? Were they engaging? Did they help you learn the content? (Q2, Appendix D)

• Have you reflected on your experience in Bamfield since you returned? If so, could you provide detail? (Q3, Appendix D)

• Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment? (Q6, Appendix D)

• If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change? (Q7, Appendix D)

• Can you tell me the most important thing that you’ve told me today? (Q8, Appendix D)

The concept of experiential education in westernized North America became popularized through the work of Kolb (1984) who based it on the theoretical ideas of Dewey (1936), Lewin (1946), and Piaget (1964). In this thesis, I refer to experiential education through Kolb’s definition, where an experience in and of itself is the source of learning. In this view, the process of learning is more important than the potential learning outcomes (Kolb, 1984, pp. 26-30). Moreover, all learning involves some sort of tension or conflict, as well as a resolution (Kolb, 1984, pp. 29-31). There also much be some sort of relationship between the learning and their environment; as in, learning does not take place in an isolated vacuum (Kolb, 1984, pp. 34-36). Most importantly, experiential education evokes a holistic sense of learning, where all senses are involved in actively constructing a new understanding
of the world (Kolb, 1984, pp. 31-34). Assuming the Bamfield experience paralleled these conditions of experiential education, the responses of the participants seem to highly endorse this style of learning.

For example, in response to Q1 (Appendix D), Carlos suggests that the experience of learning about environmentally related concepts in nature was important in engaging participants in the learning process:

I found it engaging just because, like, you’re out in nature and learning about nature. And, because you’re exposed to it, you want to learn about it and know more. Like, just being there, you’re more prone to learning. The teachers were real nice and made me want to learn more. It was also nice that there was no test afterwards – but we still learned. All the learning was actually because we wanted to (Carlos, Focus Group Interview, April 28, 2016).

Of note is Carlos’s mention that the learning was engaging despite no extrinsic end-goal, such as a test. This supports the heart of Kolb’s (1984, pp. 26-30) understanding that experiential learning is a process-oriented pedagogy as opposed to a goal-oriented pedagogy. Megan, Samantha, and Nicole echoed Carlos’s sentiment that the Bamfield experience was influential in helping to shape pro-environmental beliefs through comparing the Bamfield experience to how they normally learn in school. For example, Megan compares how the Bamfield experience is more engaging than what they would normally do at school:

Hmm… they were all engaging and they were different from like, what we do in class. Like, we do take notes and have lectures and stuff, but there were a lot of practical things. Like, after a slideshow [at school], you’re done. But in Bamfield, you have an activity right after that encompasses what we had just learned. Also, not
having tests was another cool part. Like, we were free to just learn without worrying
(Megan, Focus Group Interview, April 26, 2016).

Samantha also compares the Bamfield experience and regular school, and quantifies just how much she learned while in Bamfield:

Even though we learn it, like, I learn about you know, how important the ocean is at school, but it never really hits you in the face until you actually go out there and see it for yourself. You hear all that, but you never actually see it. So Bamfield is good for that too actually, its hands on … I actually felt like I learned a lot more in those five days than I did like, if it was just one school week – I felt like I learned a lot
(Samantha, Focus Group Interview, April 26, 2016).

Nicole echoes both Megan and Samantha as she describes why Bamfield allowed her to learn more than if she was learning the same content in school:

All the activities were very engaging. I learned way more than I have in any classroom or school setting. I was actually able to learn something and see it through in my head because it was like… right in front of me (Nicole, Focus Group Interview, April 28, 2016).

As expected with any intensive and lengthy learning experience, some participants were slightly critical of some aspects of the Bamfield experience, as noted by Dakota, Jillian, and Erica. For example, Dakota discusses how the experience was so packed full of “programs and things” that she ended up feeling tired near the end and had a hard time letting the last few sessions sink in:

I feel like the actual like programs and things we did were very educational and like, organized so you could like, pick up on all the information easily. But the thing is,
everything was all really crammed together, like one after the other, so it was like hard to like sink in everything. Yeah, it was good. I couldn’t really pay attention a lot because I got really tired like at the end, near the end (Dakota, Focus Group Interview, April 28, 2016).

Jillian also describes how she felt tired near the end and that some of them could have been more engaging:

All of them were extremely well planned out. Umm, some of them could have been more engaging, but I think that could also be because they were getting towards the end and we were all tired. But they were all excellent courses, they were pretty… all of them were pretty engaging (Jillian, Focus Group Interview, April 28, 2016).

Nonetheless, the critique seemed to be a result of low energy leading to lower engagement. Moreover, as Samantha noted, engagement was still higher than if they were back at school.

The high level of engagement amongst the participants may have been associated with the metacognitive learning throughout the Bamfield experience. Metacognitive learning occurs when learners are actively constructing new knowledge and deeper understanding about a concept (Anderson & Nashon, 2007; Baird, 1986; Baird & White, 1996; Nielsen et al., 2009). In other words, learners not only are aware of their learning, but they are actively attempting to achieve a deeper level of understanding in the process. Learners thus become better at learning within their own means as they have a sense of executive-level empowerment and control over their own learning (Baird, 1986; Kuhn, 2000; Kuhn & Dean, 2004; Nielsen et al., 2009).
For example, Landon is metacognitively aware of his own learning in describing the importance of actively changing beliefs as a result of new knowledge and understanding about a concept:

The fact that I’ve changed my beliefs. Yeah, I think that’s the most important part of learning. Cause that, sure, you can learn about all this information, but in the end it depends on what are you going to do with the information, are you just going to like sit there, or are you going to like change the way you live and the way you see things (Landon, Focus Group Interview, April 28, 2016)?

Likewise, Karina and Megan demonstrate a similar level of metacognitive awareness in describing why the Bamfield experience was so effective in helping them learn about the concepts as well as about themselves as learners. For example, Karina explains that learning about the content, themselves, and the environment was critical in terms of making the trip worth her time:

Us being able to like, learn lots at Bamfield was I think pretty important because if we didn’t learn something, there would be no point in us going. When I say learn something, I mean not like what they’re teaching us in those slideshows, but like, something that we learned about ourselves and about the environment (Karina, Focus Group Interview, April 28, 2016).

Megan continues this sentiment, recognizing that the Bamfield experience not only was engaging and memorable, but powerful in helping them learn and reflect on their new conceptions:

What we did there was learn. And that is what inspired us to say the things that we’re saying now. To like, help the environment, to become more one with nature. And so I
think the most important thing that encompasses everything that we’ve said is educating ourselves, because that’s what leads us to umm… changing things, to like, talking like this and one day, maybe changing the world somehow. So, I think education and like, teaching others is so important. And just, the Bamfield trip umm, to teach us in such a practical way, and such an engaging way, was very memorable (Megan, Focus Group Interview, April 26, 2016).

Megan continues, “We need to find ways to live sustainably, with the quality of life that we have right now, so that our grandchildren can live like this… so that the next 100 years will be different, much better (Megan, Focus Group Interview, April 26, 2016).”

An explicitly clear sense of belongingness in nature was common throughout the semi-structured focus group interviews. In exploring the literature related to this theme, I believe there is evidence that the participants experienced a sense of friluftsliv while in Bamfield. Friluftsliv, a Norwegian term that translates into English as ‘free air life’, is a concept that expresses one’s desire to return to a simple, nature-based life away from the complexities of modern society (Gurholt, 2014). Brought into the forefront of environmental education by Naess (1973), literature suggests that a sense of friluftsliv is often found amongst those with biospheric attitudes towards nature (Naess & Rothenberg, 1990), as described in the previous section. Accordingly, I believe that their sense of friluftsliv was another factor leading to their positive perspectives of experiential education and subsequent high level of engagement throughout the Bamfield experience.

For example, Carlos described how the Bamfield experience was a source of true happiness as a result of being in such a natural, simple, and engaging environment:
The whole experience, like, being in nature, it makes you realize you’re just like, another wave in the ocean. All the superficial stuff we worry about, it doesn’t really matter. It was also nice to get away from our phones for a while. All this stuff, social media, phones, they make you more depressed in a way. The happiest I’ve ever been was in nature there. Nature is where we belong (Carlos, Focus Group Interview, April 28, 2016).

Dakota and Nicole parallel Carlos’s sentiment of feeling like he belongs and is the happiest when he is in nature. For example, Dakota describes how having places where one can feel at peace is so important to her:

At Bamfield, like, it was really quiet and peaceful. And like, when we went on the nature walks, it made me realize that there’s not that many places like that are like here now because it’s all been industrialized where some people just want lots of money. It kinda made me realize that’s the most important thing (Dakota, Focus Group Interview, April 28, 2016).

Nicole describes how nature not only makes her feel happy, but allows her to develop a better sense of “Who you are … with your whole surroundings”:

I think that there is no better way than to be in nature to be able, or, to reach such a high point of like… real happiness with everything, with the Earth, with nature, with yourself. And realizing who you are, and just… with your whole surroundings. And I guess you have a… it makes you see the world in a different way (Nicole, Focus Group Interview, April 28, 2016).

According to Gurholt (2014), the feelings associated with being in nature, such as a sense of belongingness, are often difficult to describe despite nature being such a tangible place in our
Another participants, Addison, provides evidence of this trend, as she has difficulty communicating the reasons why nature was such a powerful place for her to learn:

How I felt when I was like, in the forest? I might have felt, like, inferior to… the… my surroundings because I have no idea like, what kind of organisms are there. And, I enjoyed a lot of things – I actually really enjoyed the view and Mother Nature, and the organisms that were there… Umm… Oh, I did feel like… umm, how to explain this… umm, I’m not sure, but like, in the forest, I just felt like… I have to think how to explain this. I’m going to think on this some more (Addison, Focus Group Interview, April 28, 2016).

Nonetheless, research from Naess and Rothenberg (1990) and Gurholt (2014) suggest that this sense of friluftsliv is associated with a deep ecological worldview and subsequent biospheric attitudes. Another participant, Samantha, provides strong evidence of this notion as she describes one particular experience that occurred during the Bamfield experience:

When we were sitting there having our own reflection … I felt like I was part of nature. Because I listened to the waves crashing and I just… cause I drew a picture when I was standing there, and everyone just sitting there, enjoying it and we weren’t making any sounds. I did really feel like we were one with nature. I guess it was different when I was alone. So when we were sitting there, it felt relaxing and I felt like we really belonged (Samantha, Focus Group Interview, April 26, 2016).

Overall, my findings suggest that the Bamfield experience fostered and strengthened the pro-environmental beliefs amongst the participants. The participants also developed an increased sense of connectivity to nature. The underlying causes for this shift towards stronger pro-environmental beliefs and increased sense of connectivity includes the
metacognitive nature of the Bamfield experience as well as the sense of friluftsliv experienced by the participants while in nature.

Chapter Summary

 I analyzed, interpreted, and described the impact that an environmental experience has on BC secondary science students’ attitudes and perspectives about the environment. I accomplished this through a mixed methods approach, using a survey to collect quantitative data and semi-structured focus groups to collect descriptive qualitative data. The data I collected and analyzed through the survey indicated that the environmental experience did indeed have an impact on the participants’ attitudes and perspectives about the environment. However, the direction and nature of this impact was not provided through the quantitative data, possibly as a result of my study having a low number of participants and the inability for my survey instrument to identify some pro-environmental elements such as ecocentric and/or biocentric attitudes. Nonetheless, the data I collected and analyzed through semi-structured focus groups suggest that the environmental experience impacted the participants in three key ways:

1. Participants’ pro-environmental beliefs became strengthened as a result of the environmental experience.
2. Participants felt much closer and interconnected with nature, and developed a sense of ownership over their learning as a result of the environmental experience.
3. Participants developed a preference towards learning through experiential and environmental education methods, such as ecology walks in the forest and on the
beach, boat trips to investigate invertebrates, and photosynthesis labs, compared to traditional classroom learning.

Based on these findings, the combined quantitative and qualitative dataset clearly indicates that the Bamfield experience did have a powerful impact on BC secondary science students’ attitudes and perspectives about the environment. Furthermore, these attitudes and perspectives about the environment seem to be connected to the increased metacognitive engagement and enjoyment of learning that an environmental experience provides students, as well as the sense of belongingness associated with being in nature.

In the next chapter, I provide an in-depth discussion on the quantitative and qualitative findings. I also present this discussion of the findings through three lenses: (1) as an independent researcher; (2) as a BC secondary science teacher; and (3) as an environmentally minded individual with vested interest in protecting our natural places both locally and globally.
CHAPTER 5: Discussion of Findings

Throughout this study, I wear three different hats: a researcher hat; a BC secondary science teacher hat; and a person “who just really cares about the environment” hat. While I have made every effort to limit the influence that my latter two hats have on the former, I believe that without the latter two hats, I would not be a very competent nor interested researcher. In this chapter, I present a discussion of my study’s quantitative and qualitative findings together through the lenses of these three hats. I also present what I believe to be the most significant limitation of my findings.

Researcher

I will begin this discussion by referring back to Orr (1994, pp. 8, 10-11) who reminds us that education is not simply about constructing knowledge, but constructing certain kind of knowledge. Education is for developing the kind of knowledge that is less associated with what refers to “cleverness” and short-term data gain and more associated with “intelligence” and long-term wisdom (Orr, 1994, p. 11). This includes wisdom about our own planet, from a knowledgeable connection with our local ecosystems to an understanding of global environmental issues. Moreover, echoing the perspectives of Dewey (1936) regarding experience and education, Orr (1994, p. 14) contends that the process of education is as important as the content if we are to develop such an intelligence. In other words, and from a theoretical standpoint, providing experiences that educate students to interact with, learn from, and connect with the environment are critical if our intentions are to foster intelligence and long-term wisdom that respects and values our natural environment.
I believe that this study provided evidence for this theoretical perspective. For example, not only did the Bamfield experience have an impact on BC secondary science students’ attitudes and perspectives about the environment, it also provided an opportunity for students to develop a sense of belonging and interconnectedness with nature while learning about themselves and the environment. Together, the responses of two participants in particular (Karina and Megan) support this phenomenon when asked what would be the most important thing they could share about the Bamfield experience. Karina starts with:

Us being able to like, learn lots at Bamfield was I think pretty important because if we didn’t learn something, there would be no point in us going. When I say learn something, I mean not like what they’re teaching us in those slideshows, but like, something that we learned about ourselves and about the environment (Karina, Focus Group Interview, April 28, 2016).

Followed by Megan:

What we did there was learn. And that is what is what inspired us to say the things that we’re saying now. To like, help the environment, to become more one with nature. And so I think the most important thing that encompasses everything that we’ve said is educating ourselves, because that’s what leads us to umm… changing things, to like, talking like this and one day, maybe changing the world somehow (Megan, Focus Group Interview, April 26, 2016).

Another way that my study supports the theoretical perspective that environmental experiences are capable of fostering intelligence and long-term wisdom is through the metacognitive engagement and awareness that the Bamfield experience elicited amongst the students. For example, Landon, with a response that parallels Orr’s (1994, p. 14) and Hart et
al.’s (1999) assertion that education is best approached when learning includes an action-oriented focus on the betterment of the planet explains that the most important thing he could share about the Bamfield experience is:

The fact that I’ve changed my beliefs. Yeah, I think that’s the most important part of learning. Cause that, sure, you can learn about all this information, but in the end it depends on what are you going to do with the information, are you just going to like sit there, or are you going to like change the way you live and the way you see things (Landon, Focus Group Interview, April 28, 2016)?

Landon’s awareness that his own beliefs changed as a result of the Bamfield experience is certainly metacognitive; however, Landon’s awareness that his beliefs changed and recognized the importance of taking action as a result of the conceptual change shows that the experience was both metacognitive and representative of the education required to address our environmental issues.

While I acknowledge that as a researcher I bring my own bias in interpreting these findings, I think that there is some room for arguing about the overall message that participants intend to convey with their responses. Certainly there are numerous other angles and themes that another researcher could extract from the participants’ responses; however, I think the findings are clearly in support of the ability for environmental experiences to foster pro-environmental attitudes and perspectives.

One might argue that this is simply evidence of a “honeymoon-hangover effect” (Boswell, Boudreau, & Tichy, 2005), which suggests that the environmental experiences to illicit metacognitive awareness and engagement wear off over time. I will address such a criticism with three points. First off, the participants were candid in their critique of
particular components of the Bamfield experience (especially the intensity of the schedule), as explained by Dakota:

But the thing is, everything was all really crammed together, like one after the other, so it was like hard to like sink in everything. Yeah, it was good. I couldn’t really pay attention a lot because I got really tired like at the end, near the end (Dakota, Focus Group Interview, April 28, 2016).

And supported by Jillian, who states “Umm, some of them could have been more engaging, but I think that could also be because they were getting towards the end and we were all tired (Jillian, Focus Group Interview, April 28, 2016).” While they do suggest that they were losing engagement, they note that the diminishing engagement was mostly because they were tired, not due to the learning methods or content. Moreover, if the participants felt that the Bamfield experience would lose the ability to spark metacognitive awareness and engagement over time, they could have stated so in the semi-structured focus groups.

Secondly, even if the ability for environmental experiences to spark metacognitive awareness and engagement decreases over time, I say: So what? Clearly any sort of metacognitive awareness and engagement is better than none at all if meaningful learning does take place (which this study has shown). I struggle to believe that a stagnant education system without novel or exciting opportunities is better than an education system that encourages teachers to find new and unique ways to continually spark their students’ metacognitive awareness and engagement.

Third, I believe this reveals a clear research opportunity: what are the long-term metacognitive learning effects of an environmental and experiential education programme? I will discuss this point further in the next chapter.
When I was completing my pre-service teaching program at Simon Fraser University in 2011, I completed an assignment focused on the development of my central credo as an educator. My credo, as stated in the assignment, was: “I believe that learning is most significant and valuable when it is learned in authentic situations, so that learners experience and reflect on real world and meaningful situations.” What I meant to say then, in light of my now increased academic and pedagogical understanding, is that I really believe that experiential learning elicits students’ metacognitive awareness and skills. In reflecting on my credo statement, I find it amusing that I had no idea that there was such a rich research paradigm for such sentiments. While I am still a “fresh” teacher, as some of my colleagues might remind me (a little too often in my opinion), I think that the past five years of teaching provided me with the opportunity to really challenge this credo in practice.

One aspect this study has really illuminated, both in relation to my pre-service credo and now in my opinion as a BC secondary science teacher, is the candid, metacognitive ownership that the students possess over their own learning, attitudes, and perspectives, especially when provided with opportunities that really engage them in their learning. For example, when asked what specifically occurred in Bamfield that may have affected their beliefs about the environment, both Carlos and Nicole discuss how happy they were while learning in Bamfield, starting with a simple yet powerful claim from Carlos, who explains that “The happiest I’ve ever been was in nature there. Nature is where we belong.” Nicole follows up Carlos’ sentiments, making reference to the metacognitive aspect of the experience:
I think that there is no better way than to be in nature to be able, or, to reach such a high point of like… real happiness with everything, with the Earth, with nature, with yourself. And realizing who you are, and just… with your whole surroundings. And I guess you have a… it makes you see the world in a different way (Nicole, Focus Group Interview, April 28, 2016).

While I am not necessarily surprised by these sentiments, as I am privy to witnessing BC secondary science students’ ability to think metacognitively on a routine basis as a teacher in a BC public school, I was taken aback by many of the participants’ candid, articulate and sincere descriptions about their own learning, attitudes, and perspectives. In a given day in a classroom, it is difficult to retrieve any sort of sincerely emotional or candid metacognitive reflection from students about their own learning unless low marks from a test are involved. Therefore, finding ways to excite my students and provide them with learning opportunities where they so openly and candidly enjoy the experience is nearly all I could ask for as a teacher.

Personal Interest in the Environment

Going back even further into my undergraduate degree at Simon Fraser University (or, as I like to call it: The Concrete Starship Enterprise), I will step back into BISC 309: Conservation Biology with our shark-loving professor, Dr. Dulvy. Near the end of our course, Dr. Dulvy (personal communication, April 2009) seemingly casually stated, “While doctors save lives, conservationists save species.” This quote really resonated with me, especially as I was in the midst of a cognitive showdown between two career-paths, to become a conservation biologist or become a biology teacher. While I initially leaned
towards the former, especially as I had a cool gig working as a field crewmember with a local conservation organization, it was another class that swayed me in the other direction as it added a new twist to Dr. Dulvy’s statement. In BISC 326: Algae and Fungi with Dr. Bisgrove, we took a weeklong trip to Bamfield to study algae. While in Bamfield, I recalled how much fun I had while I was a high school student just becoming acquainted with marine biology for the first time (being from the Okanagan, there are not many marine algae species to study). I wondered to myself: if doctors save lives and conservationists save species, what could hundreds of conservationists save? What if I had the ability to inspire hundreds of students to become conservationists?

For me, not simply as a teacher, but as a person who has a deeply vested interest in environmental issues, such as the conservation of local BC ecosystems, the findings of this study have provided a sense of hope and excitement for those who shall inherit the Earth. When students are willing to put down their phones and enjoy the solitude, peacefulness, and tranquility that nature can provide, I know I have made the right choice. For example, as Samantha describes her happiness while sitting alone and reflecting, I cannot help but grin, as I know that she is not becoming an environmentally minded person, rather she already is an environmentally minded person:

When we were sitting there having our own reflection … I felt like I was part of nature. Because I listened to the waves crashing and I just… cause I drew a picture when I was standing there, and everyone just sitting there, enjoying it and we weren’t making any sounds. I did really feel like we were one with nature. I guess it was different when I was alone. So when we were sitting there, it felt relaxing and I felt like we really belonged (Samantha, Focus Group Interview, April 26, 2016).
Again, we are all free to interpret the findings of both our own and anyone else’s studies as we wish. However, the three hats that I wore throughout the duration of this study provided me with an opportunity to understand, analyze, reflect, and celebrate the findings that were produced through the Bamfield experience.

Chapter Summary

In this chapter, I discussed the findings of my study through three lenses: (1) myself as an independent researcher; (2) myself as a BC secondary science teacher; and (3) myself as a person “who just really cares about the environment.” Within this discussion, I provided specific examples from the findings and justified why I interpreted the findings in the ways I did. In the next and final chapter of my thesis, I will conclude by providing a summary of the study and justifying how I addressed the research questions, discussing possible implications of the study, and finishing with some suggestions for further research as a result of the study.
CHAPTER 6: Summary, Implications, and Future Research

In this final chapter of my thesis, I will provide a summary of my findings by addressing the research questions that guided my study. I will then discuss implications of my study and provide my ideas on some potential avenues for further research. Lastly, I will finish with my own concluding thoughts, including a reflective insight into how I have changed throughout the process.

Research Questions

1. What is the impact of an environmental experience on the environmental attitudes of BC science students?

2. How have the environmental attitudes of BC science students shifted as a result of the environmental experience, as measured by both quantitative and qualitative methods? (i.e., are they more or less pro-environmental)

3. What facets of the environmental experience might have led to change(s) in the environmental attitudes of BC science students?

Summary

Below I will summarize how this study has addressed the three research questions that I discussed earlier.

Research Question #1

*What is the impact of an environmental experience on the environmental attitudes of BC science students?*
The first question was designed to investigate whether an environmental experience has an impact on the environmental attitudes of BC science students. This study has provided both quantitative and qualitative evidence that environmental experiences, such as a trip to the Bamfield Marine Research Centre, may have an impact on the environmental attitudes of BC science students. The quantitative evidence consists of data collected from pre-and-post trip NEP surveys (Dunlap & Van Liere, 2008) with 27 participants. The results of the pre- and post-trip surveys show that the Bamfield experience had a statistically significant impact ($p = .000$) on student attitudes about the environment. The qualitative evidence consists of data collected from three semi-structured focus groups with questions adapted from Ballantyne et al. (2010) with 15 participants. The results indicate that the Bamfield experience did have an impact on student attitudes and perspective about the environment. Research Questions #2 and #3 provide a direction and description of the impact.

Research Question #2

*How have the environmental attitudes of BC science students shifted as a result of the environmental experience, as measured by both quantitative and qualitative methods? (i.e., are they more or less pro-environmental)*

In response to the second of my research questions, the qualitative data showed that the environmental experience did indeed shift the student’s attitudes towards a more pro-environmental view. This is supported by the three key findings of my qualitative data:

1. Participants’ pro-environmental beliefs became *strengthened* as a result of the environmental experience.

2. Participants felt much closer and interconnected with nature, and developed a sense of ownership over their own learning as a result of the environmental experience.
3. Participants developed a preference towards learning through experiential and environmental education methods compared to traditional classroom learning.

Research Question #3 addresses the underlying factors that led to these three major study findings.

Research Question #3

*What facets of the environmental experience might have led to change(s) in the environmental attitudes of BC science students?*

The third research question was focused on which factors may be responsible for these changes in student environmental attitudes. The qualitative data produced by this research suggests that the increase in metacognitive awareness, understanding, and learning that occurred as a result of and throughout the Bamfield experience was a key factor that led to the change in BC science students’ attitudes and perspectives about the environment. Furthermore, the learning occurred through assimilation of new knowledge into their previously held conceptual understandings. Another key factor that the qualitative data illuminated as a reason for BC science students developing pro-environmental attitudes and perspectives is the sense of belongingness while in nature that the students experienced while in Bamfield.

Implications

These findings support a growing body of research suggesting that environmental, and nature-based learning experiences are often responsible and positively correlated with one’s beliefs, attitudes, or worldviews regarding the environment. In addition to adding to the growing literature that already exists within this field, I believe my research is timely in that
it aligns with the UN’s GAP for ESD commitments. Furthermore, it provides evidence that education outside of traditional settings (i.e., a classroom) is equally – if not more – capable at developing critical, metacognitive, and deeper understanding skills than education in traditional settings.

In relation to our local curriculum landscape in BC, I believe that my findings support the infusion of experiential and place-based competencies, content, and language found within our new curriculum. Furthermore, they offer a pedagogical method for teachers to actively meet the expectations of our new curriculum. For example, I believe the Bamfield experience allowed me to meet the following Curricular Competencies found in the new BC Life Sciences 11 document (British Columbia, 2016), as outlined by Table 11:

Table 11

*Examples of ESD in Grade 11 Life Sciences Curricular Competencies*

| Processing and analyzing data and information | • Experience and interpret the local environment
| • Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information |
| Evaluating | • Consider social, ethical, and environmental implications of the findings from their own and others’ investigations |
| Communicating | • Express and reflect on a variety of experiences, perspectives, and worldviews through place |

This is a timely implication as many teachers in BC are likely scrambling to find ways to meet the expectations of the new BC curriculum. While this is anecdotal in nature, my role as a BC science teacher has allowed me to be privy to teachers discussing their anxiety over the new curriculum and how they can properly meet the expectations.
Future Research

These findings suggest several possible avenues for future research. Firstly, additional investigation of the different types of beliefs that may be developed as a result of an environmental experience should be conducted – for example, beliefs related to religion, culture, identity, etc. Moreover, research investigating the assimilation and/or accommodation that may occur as a result of environmental experiences would be helpful identifying the precise nature of how students undergo conceptual change while learning through environmental experiences.

Another avenue of research would be conducting similar studies using other scales of measurement related to student attitudes about the environment, such as the Nature Relatedness scale developed by Nisbet et al. (2009). While the NEP scale was helpful in addressing my research question, the findings corroborated the limitation of NEP to identify whether the students environmental concerns were rooted in biocentric or ecocentric worldviews (Anderson, 2012). The Nature Relatedness scale is designed to identify the biospheric or ecocentric worldviews behind environmental concerns, and thus may be insightful in helping to further identify the worldviews that are developed through environmental experiences Nisbet et al. (2009).

Moreover, research into the metacognitive learning that may take place during environmental experiences may provide further evidence that metacognition is a factor in helping to foster pro-environmental beliefs and attitudes amongst participants. Lastly, research that measures the longitudinal impact of an environmental experience would help to inform whether the pro-environmental beliefs and attitudes that developed, as well as the
metacognitive awareness and engagement that occurred as a result of the Bamfield experience, are persistent over a period of time.

Conclusion

This study of how an environmental experience impacts the environmental attitudes and perspectives of BC secondary science students provides evidence of the ability for environmental experiences to have a profound impact on BC secondary science students, even beyond their environmental attitudes and perspectives. Through forest walks, beach explorations, boat trips to investigate invertebrates, and roundtable discussions on climate and ecosystems, students felt a strong belief that the environment needs to be cared for, protected, and enjoyed by all. They described how they felt interconnected to nature throughout the environmental experience, and that they were truly happy and at home when in nature. Lastly, they also showed evidence of their metacognitive awareness of their own learning, and spoke strongly in support of experiential learning methods compared to traditional classroom methods.

Now reflecting back on this experience, it is clear that I have learned a whole lot throughout this experience, especially when listening to the students describe their own interpretation of the environmental experience. For example, I have learned that students really are yearning to be outside and connect with nature – and that all the technological stimulation in the world simply cannot replace the feeling students have when they’re completely immersed in nature. This particular lesson hits hard as I am reminded of my own childhood where I was always happiest outdoors, when I was free to play, run, touch, and sense whichever stimuli nature threw at me. Another lesson that I have learned through this
experience is that students are deeply invested in their own learning if we provide them with learning opportunities that they feel are valuable and engaging. As teachers, we spend so much time planning lessons that “cover the content” that we often forget what it’s like to be a student in our classes. While we certainly can provide valuable and engaging lessons within a classroom, we need to recognize that learning simply cannot occur when there is nothing but dry, theoretical content. It really is our duty to provide engaging, stimulating, and concrete experiences for students to learn from.

Most important, I am reminded that there is brightness in our planet’s future. Caring for the environment is often a dark and pessimistic pursuit, especially when we recognize the magnitude of the human-induced problems that our planet is facing. Yet, with every hand that feels the bark on an 800-year-old tree, there is one more voice fighting to preserve our local rainforest. With every young foot that feels the smooth sand on an ocean beach, there is one more dedicated mind working to address ocean acidification. And with one more student who feels at home in nature, there is one more deeply invested soul who will stop at nothing to protect their home. While the task of dealing with our planet’s environmental issues is complex, complicated, and a seemingly heavy burden, I truly believe that our youth is yearning to learn how to succeed at solving the problems we have created for ourselves. Yet, the only way that they will succeed is if we, as educators, provide them with the necessary opportunities to feel connected to nature in the first place.
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Appendix A – Bamfield Itinerary

ITINERARY
Magee Secondary School (Vancouver)
April 8th to 12th, 2016
Colin Mayer, 34 people (23+2F; 7+2M)
Grade 11

Friday, April 8th (Low tide of 0.7 m @ 20:00)
15:00 Arrival at BMSC, check in and settle into accommodations. Meet at the traffic circle for tour of the facilities.
16:00 Group A: Lab: Marine invertebrate diversity in Barkley Sound (Whale Lab)
Group B: Field trip: Temperate rainforest ecology (Meet in traffic circle, wear boots)
18:00 Dinner
19:00 ALL: Workshop: Marine Conservation Case Studies (Rix A)

Saturday, April 9th (Low tide of 0.2 m @ 08:43; Low tide of 0.7 m @ 20:00)
7:30 Breakfast
8:30 Group A: Lab: Primary productivity part 1 (Lower main lab) followed by Field Trip: Examination of life on docks and pilings.
Group B: Lab: Marine invertebrate diversity in Barkley Sound (Whale Lab)

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<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
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<tbody>
<tr>
<td>10:30 Field trip: Ocean sampling aboard the BMSC research vessel Alta (Meet at docks)</td>
<td>Field trip: Oceanography and coastal biodiversity (Meet at docks)</td>
<td>Lab: Seaweed ecology, ID, and human uses (Lower Main lab)</td>
</tr>
</tbody>
</table>

12:30 Lunch
13:30 Group A: Field trip: Temperate rainforest ecology (Meet in traffic circle, wear boots)
Group B: Lab: Seabirds as indicators of ecosystem health (Ross hall)

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<th>Group 1</th>
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<th>Group 3</th>
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<tbody>
<tr>
<td>15:30 Field trip: Oceanography and coastal biodiversity (Meet at docks)</td>
<td>Field trip: Ocean sampling aboard the BMSC research vessel Alta (Meet at docks)</td>
<td>Field trip: Oceanography and coastal biodiversity (Meet at docks)</td>
</tr>
</tbody>
</table>

18:00 Dinner
19:00 Group A: Lab: Primary productivity part 2 (Lower main lab)
Group B: Workshop: Climate change grant proposal (Ross hall)
21:30 Group B: Field trip: Magee teacher-led bioluminescence from the docks

Sunday, April 10th (Low tide of 0.2 m @ 09:33)
7:30 Breakfast
8:30 ALL: Field trip: Sandy and rocky shores of Brady’s beach (Meet at docks)
FT Staff: EFS also at Brady’s, coordinate return shuttling.
12:30 Lunch

Magee Secondary School, Sunday April 10th, continued…
13:30 **Group A:** Workshop: Climate change grant proposal (Rix A)
**Group B: Lab:** Microscopic examination of plankton and discussion of oceanographic data (Rix lower level)

15:30 **Group A: Lab:** Microscopic examination of plankton and discussion of oceanographic data (Rix lower level)
**Group B: Lab:** Experimental marine biology (Whale Lab)

18:00 Dinner
19:00 **All:** Slide show: Marine mammals of the west coast (Rix A)

**Monday, April 11th (Low tide of 0.3 m @ 10:25)**

7:30 Breakfast

8:30 **Group A:** Lab: Experimental marine biology (Whale Lab)
**Group B:** Lab: Primary productivity part 1 (Lower main lab)
followed by Field trip: Examination of life on docks and pilings.

10:30 **All:** Field trip: Intertidal explorations at Aguilar Point (Meet at docks)
12:30 Lunch

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<tbody>
<tr>
<td>13:30</td>
<td>Lab: Seaweed identification, ecology, and human uses (Lower Main lab)</td>
<td>Field trip: Ocean sampling aboard the BMSC research vessel Alta (Meet at docks at 13:20)</td>
</tr>
</tbody>
</table>

15:45 **ALL:** Workshop: Career Panel (Rix A)

16:30 **Group A:** Lab: Adaptations in marine mammals (Whale Lab)
**Group B:** Lab: Primary productivity part 2 (Lower Main lab)

18:00 Dinner

19:00 **Group A:** Lab: Fish form and function (Lower Main Lab)
**Group B:** Lab: Adaptations in marine mammals (Whale Lab)

21:30 **Group A:** Field trip: Teacher-led bioluminescence from the docks

**Tuesday, April 12th, (Low tide of 0.5m @ 11:23)**

7:30 Pack up and move out of accommodations. Move bags to Cafeteria Lounge or Main Building foyer, then go to breakfast

8:30 **Group A:** Lab: Seabirds as indicators of ecosystem health (Ross Hall)
**Group B:** Lab: Fish form and function (Lower main lab)

10:30 (Optional) souvenir sales at the BMSC store (Whale lab) *one group at a time*

11:00 Depart BMSC
Appendix B – Consent Forms

THE UNIVERSITY OF BRITISH COLUMBIA

INFORMED PARENTAL CONSENT FORM

A study on “The Impact of an Environmental Experience on Students’ Environmental Attitudes”

Principal Investigator:

Dr. Sandra Scott, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: [redacted]. E-mail: [redacted]

Co – Investigator:

Colin Mayer, Graduate student, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: [redacted]. E-mail: [redacted]. The Research to be conducted is for the completion of a graduate thesis to fulfill the requirements for a Master of Arts in Science Education.

Dr. Marina Milner-Bolotin, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: [redacted]. E-mail: [redacted]

Dr. J. Douglas Adler Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: [redacted]. E-mail: [redacted]

Introduction:
We are conducting a research study on how an **environmental experience, such as a field trip, might affect students’ attitudes about the environment**. A research study is a way that we can learn more about a particular phenomenon or discover connections between two or more phenomena. For example, we might use a research study to see if people’s concern for nature increases after they go camping in a BC park.

The decision for your child to take part, or not take part, in this study is up to you.

**Purpose:**

This study aims to research how an environmental experience, such as a field trip to Bamfield Marine Science Centre, may have an effect on British Columbian science students’ attitudes and perspectives about the environment.

Your child has been invited to participate because your child is a British Columbian science student partaking in an environmental experience at the Bamfield Marine Science Centre. British Columbian science students, have been chosen for this study because they will be enrolled in a course that encourages critical thinking and reflection on scientific and environmental issues.

**Study Procedures:**

Your child will partake in a well-established field trip to Bamfield Marine Science Centre (see [http://www.bamfieldmsc.com/education/educators](http://www.bamfieldmsc.com/education/educators) for more information about the experience) with the rest of your class. The researcher (Colin Mayer) will collect research data by having you complete a short survey before and after the trip to Bamfield Marine Science Centre. The researcher may also conduct interviews with your child and other students in a group setting after the trip has concluded.

It will therefore take a maximum of 90 minutes to participate in this study. 15 minutes will be for the pre-survey; 15 minutes will be for the post-survey; and 60 minutes will be for the interview.

**Confidentiality:**

All data in this study will be treated with high confidentiality. We will use pseudonyms to protect your child’s identity. In addition, all hard documents involving the project will be kept in a locked filing cabinet whereas the computerized ones will be saved on a password protected encrypted computer.
We encourage all participants to refrain from disclosing the contents of the discussion outside of the interview; however, we cannot control what other participants do with the information discussed, so confidentiality cannot be assured for participants in the focus group.

**Contact Information about this study:**

If you have any question or are in need of further information about this study you may contact Dr. Sandra Scott at [contact information], email: [email] or Colin Mayer at [contact information], email: [email].

**Consent:**

Your child’s participation in this study is entirely voluntary. Your child may refuse to participate or withdraw from the project at any time.

Your signature indicates that you agree to allow your child to participate in this study and that you have kept a copy of this form for your records.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at [contact information] or if long distance e-mail [email] or call toll free [number].

Your signature below is required for you to participate in this study.

I agree / do not agree (circle one) ___________________ (name of student) to participate in the study regarding “The Impact of an Environmental Experience on Students’ Environmental Attitudes”. I have read and understand the consent form.

-----------------------------------------------------------------------

Parent/Guardian Signature [signature] Date [date]

-----------------------------------------------------------------------

Printed Name of Parent/Guardian Signature [signature]
INFORMED STUDENT CONSENT FORM

A study on “The Impact of an Environmental Experience on Students’ Environmental Attitudes”

Principal Investigator:

Dr. Sandra Scott, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: __________________________. E-mail: __________________________

Co – Investigator:

Colin Mayer, Graduate student, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: __________________________. E-mail: __________________________. The Research to be conducted is for the completion of a graduate thesis to fulfill the requirements for a Master of Arts in Science Education.

Dr. Marina Milner-Bolotin, Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: __________________________. E-mail: __________________________

Dr. J. Douglas Adler Faculty of Education, Department of Curriculum and Pedagogy, University of British Columbia. Phone: __________________________. E-mail: __________________________

Introduction:

We are conducting a research study on how an environmental experience, such as a field trip, might affect students’ attitudes about the environment. A research study is a way that we can learn more about a particular phenomenon or discover connections between two
or more phenomena. For example, we might use a research study to see if people’s concern for nature increases after they go camping in a BC park.

The decision to take part, or not take part, in this study is up to you. However, your parents also know about this study, and they too have the right to allow you, or not allow you, to participate in this study.

**Purpose:**

This study aims to research how an environmental experience, such as a field trip to Bamfield Marine Science Centre, may have an effect on British Columbian science students’ attitudes and perspectives about the environment.

You have been invited to participate because you are a British Columbian science student partaking in an environmental experience at the Bamfield Marine Science Centre. British Columbian science students, such as yourself, have been chosen for this study because they will be enrolled in a course that encourages critical thinking and reflection on scientific and environmental issues.

**Study Procedures:**

You will partake in a well-established field trip to Bamfield Marine Science Centre (see [http://www.bamfieldmsc.com/education/educators](http://www.bamfieldmsc.com/education/educators) for more information about the experience) with the rest of your class. The researcher (Colin Mayer) will collect research data by having you complete a short survey before and after the trip to Bamfield Marine Science Centre. The researcher may also conduct interviews with you and other students in a group setting after the trip has concluded.

It will therefore take a maximum of 90 minutes to participate in this study. 15 minutes will be for the pre-survey; 15 minutes will be for the post-survey; and 60 minutes will be for the interview.

**Confidentiality:**

All data in this study will be treated with high confidentiality. We will use pseudonyms to protect your identity. In addition, all hard documents involving the project will be kept in a locked filing cabinet whereas the computerized ones will be saved on a password protected encrypted computer.
We encourage all participants to refrain from disclosing the contents of the discussion outside of the interview; however, we cannot control what other participants do with the information discussed, so confidentiality cannot be assured for participants in the focus group.

**Contact Information about this study:**

If you have any question or are in need of further information about this study you may contact Dr. Sandra Scott at [redacted], email: [redacted] or Colin Mayer at [redacted], email: [redacted].

**Consent:**

Your participation in this study is entirely voluntary. You may refuse to participate or withdraw from the project at any time.

Your signature indicates that you agree to participate in this study and that you have kept a copy of this form for your records.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at [redacted] or if long distance e-mail [redacted] or call toll free [redacted].

Your signature below is required for you to participate in this study.

I **agree / do not agree** (circle one) to participate in the study regarding “*The Impact of an Environmental Experience on Students’ Environmental Attitudes*”. I have read and understand the consent form.

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Printed Name of the Student
Appendix C – New Ecological Paradigm Survey

The Revised New Ecological Paradigm (NEP) Scale Statements

1. We are approaching the limit of the number of people the Earth can support.
2. Humans have the right to modify the natural environment to suit their needs.
3. When humans interfere with nature it often produces disastrous consequences.
4. Human ingenuity will insure that we do not make the Earth unlivable.
5. Humans are seriously abusing the environment.
6. The Earth has plenty of natural resources if we just learn how to develop them.
7. Plants and animals have as much right as humans to exist.
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
9. Despite our special abilities, humans are still subject to the laws of nature.
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.
11. The Earth is like a spaceship with very limited room and resources.
12. Humans were meant to rule over the rest of nature.
13. The balance of nature is very delicate and easily upset.
14. Humans will eventually learn enough about how nature works to be able to control it.
15. If things continue on their present course, we will soon experience a major ecological catastrophe.

(Dunlap & Van Liere, 2008)

The seven even numbered items, if agreed to by a respondent, are meant to represent statements endorsed by the dominant social paradigm (DSP). The eight odd items, if agreed to by a respondent, are meant to reflect endorsement of the new environmental paradigm (NEP) (Anderson, 2012).
Appendix D – Semi-Structured Focus Group Interview Questions

Proposed Semi-Structured Interview Questions

1. How did you enjoy your field trip last week? What key things stick in your mind from your experiences at Bamfield? (2 mins)

2. How did you find the activities we did while on the trip? Were they engaging? Did they help you learn the content? (3 mins)

3. Have you reflected on your experience in Bamfield since you returned? If so, could you provide detail? (5 mins)

4. While in Bamfield, how did you view yourself in relation to the environment around you (5 mins)

5. What have you learned about your own beliefs while in Bamfield? (5 mins)

6. Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment? (5 mins)

7. If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change? (5 mins)

8. Can you tell me the most important thing that you’ve told me today? (5 mins)

Adapted from (Ballantyne et al., 2010).
Appendix E – Semi-Structured Focus Group Interview Responses

1. How did you enjoy your field trip last week? What key things stick in your mind from your experiences at Bamfield?

Addison – I think I liked their system of teaching us. First, they would explain a certain organism, and then they would let us um… use hands on experiments, and actually come up with experiments. Um… I really enjoyed the trip, um… I think I might go again next year.

The beach was fun.

Caroline – Umm… yeah, like… I like how they, like, have the organisms there so you can, like, see what they look like and you can touch it. And I like the part where we got to, like, think, do our own experiment, like with the sea snails or like the sea stars… yep.

Yeah, I also liked going to the beach.

Megan – I really enjoyed my trip. It was very enlightening. One of the events I really liked was going on Alta and doing the dredges because we actually, like, got to view things first hand instead of seeing things on a slideshow. This trip actually made me want to study biology in university. It like… made me look at the world a different way.

Carlos – It was a life changing experience. For sure. I had a great time at Bamfield. Everything was just so… great, like, no down points. The things that stood out for me were… the bioluminescence, um, the stars, and the Alta. Honestly, it inspired me to pursue my passion in Biology.

Nicole – I thought of it as an amazing experience. Umm… it made me want to study Biology in the future, as like, now, I’m more interested in it. I also really liked the Alta, the stars, and bioluminescence the most. It was just a great experience.

Elise – I thought the trip was really fun, and opened my eyes to a new way of learning, like, not just in a classroom. Also, a lot of the things that we did were very interesting, like the stars, the bioluminescence, they were really fun. And the instructors were, like, all really nice which made the experience really welcoming.

Chloe – Yeah, I really liked it too. It was an unbelievable and unforgettable experience. Like, it made me want to pursue Biology… because I wasn’t really sure before. It made me want to practice it not just, like, in an academic setting but also in like… a personal level… like what I could do for the world. The instructors were also relatable. I really liked some of our discussions.

Karina – Umm, the bioluminescence activity, and forest walk to the beach and back.
Dakota – It was fun. And like, I guess the walk to the beach too. I thought the dredge was pretty fun except that I got seasick, but it was pretty fun and we got to see an octopus… but it was pretty cool. Got to see all the ocean animals and touch it. Oh and I liked it when we went to that beach…yeah, Brady’s beach, that was fun.

Jillian – Umm, it was a great field trip. It was, um… I really enjoyed it. It really brought… I think the key thing that it brought back, it really brought back my love for marine biology again. It kind of got lost… it wasn’t really lost, its always been there, but it really sparked it again.

Erica – What I enjoyed? I thought the trip was very fun, and I enjoyed seeing all the animals that live in the area, and the water, and all the plants, and all the biodiversity, because I never thought… like when you look over water, you never see what’s really below it, so it was pretty cool.

Samantha – It was really educational. Like, I didn’t know that there would be all that science, like right after another, like all those labs that we did, it was fun. It was nice that we didn’t have to, like we weren’t *forced* to take notes – because then you can actually listen to what they’re saying. And it also makes it more interesting, instead of focusing just on the writing, we have hands on experience.

Avery – I enjoyed the trip, um also, for the scenery as well. And umm, I just loved how everything was really natural, and there were no buildings or no industry nearby, like most of our trips that we go to. Um, and everyone was like really friendly there, everyone seemed to have a good time, and I just learned a lot more than I would have learned in a regular class, like now what we’re doing in chemistry. And, umm, then… I felt like there was a lot of like, bonding as well than just like being in school, because when you’re outdoors, you happen to… its like you open up to people a lot more and you just get to understand them a lot more than if you were in a classroom in a very contained room.

Landon – I really enjoyed, like, just being able to room with my friends. Because, in my old school, I used to have a yearly trip where we would go to a camp or so. And, when I moved to [our school], I never was in leaders, so I didn’t get to do that, so being able to go to Bamfield and learn all this interesting stuff and just being able to hang out with my friends was actually really nice.

Chase – Well, uh, the trip itself was very enjoyable I guess. It’s nice to be back uh, outdoors I guess, like, well like, since I grew up in the interior of BC, I guess I enjoy the like more rural area better than the urban area I guess – its refreshing. And then, umm, events that really stuck out in my mind I guess, would probably be doing the dredge on the Alta, uh… the bioluminescence on the dock was also very uh… I guess, I don’t know how to say this, but just like, uhh… I forgot the word. Just very memorable I guess? Uhh, I guess the scenery as well, its just very vivid in my mind I guess, yeah.
2. How did you find the activities we did while on the trip? Were they engaging? Did they help you learn the content?

**Addison** – Yeah they were really good. I think they were actually really engaging. I actually really like that more than what we do at school. Er, I remember a lot of things from that trip, because it was straightforward… um, it was… I don’t know - the learning system was… the information stays inside our brains and our minds.

And I really liked that, uh, walk through the forest, and how we were put into groups and we get to teach the other groups about a certain plant, and that way we can… we also know what we’re talking about and what we’re learning about… that way we can really remember what they’re teaching us.

**Caroline** – The information stays in your brain I think because there’s like the actual organisms there, and we like do stuff instead of just sitting inside of a classroom and having a person talk.

**Megan** – Hmm… they were all engaging and they were different from like, what we do in class. Like, we do take notes and have lectures and stuff, but there were a lot of practical things. Like, after a slideshow [at school], you’re done. But in Bamfield, you have an activity right after that encompasses what we had just learned. Also, not having tests was another cool part. Like, we were free to just learn without worrying.

**Carlos** – I found it engaging just because, like, you’re out in nature and learning about nature. And, because you’re exposed to it, you want to learn about it and know more. Like, just being there, you’re more prone to learning. The teachers were real nice and made me want to learn more. It was also nice that there was no test afterwards – but we still learned. *All the learning was actually because we wanted to.*

**Nicole** – Umm, all the activities were very engaging. I learned way more than I have in any classroom or school setting. I was actually able to learn something and see it through in my head because it was like… right in front of me.

**Elise** – A lot of the learning was hands on, so that is something that is missing in a classroom setting. Like, everything was really engaging, like the instructors, they would use games and wouldn’t let us feel sleepy. The lectures tied into current issues that we sort of know about… and it was just like… really interesting to learn.

**Chloe** – The activities were really engaging because they were hands on. For example, being able to see the specimen, like, not from a textbook but in real life, and seeing how they interact in their habitat, it was interesting. Also, being able to talk to the instructors and, like, see how they think about the issues helped us learn more… and better. We were more engaged so we learn in a way where we can actually remember the information.
Karina – I thought they were really well developed. Like, the structure of it was like... well done for us to like... learn stuff from it. Like, I actually got a lot from it, like the seabirds, climate change, and like orca whales – it was really diverse though, like there were some PowerPoints, there were some like presentations that we had to do, and I thought that it was well fit for us, if that makes sense.

Dakota – I feel like the actual like programs and things we did were very educational and like, organized so you could like, pick up on all the information easily. But the thing is, everything was all really crammed together, like one after the other, so it was like hard to like sink in everything. Yeah, it was good. I couldn’t really pay attention a lot because I got really tired like at the end, near the end.

Jillian – Umm, all of them were extremely well planned out. Umm, some of them could have been more engaging, but I think that could also be because they were getting towards the end and we were all tired. But they were all excellent courses, they were pretty… all of them were pretty engaging.

Erica – I didn’t know we were going to do so many labs. I thought it would be more like outdoors and stuff… but I actually really enjoyed it, because the way they taught us and the way they presented it, they taught and presented creatively and it was a lot of fun. Learning was really fun and it wasn’t boring at all. We would have like… like, our classes won’t be long, they would be pretty short, so our attention span is shorter and then, yeah, I enjoyed it. And I enjoyed going on the boat ride, it was a lot of fun. The [activities] were were engaging and they were a lot of fun.

Yeah, and during the seabirds lab, I remember kind of like, drifting off a bit. But then when we started like, did the hands on work with the plastics and kind of measuring amount of plastic in seabirds, it was kind of like… it was more cool, and I think that was the thing that made most of the activities fun - that we were more engaged in the research. It was not the concept, we didn’t learn the concept, but we experienced it. We saw it with our own eyes. She showed us a video, and it was really heartbreaking, I was crying. And all the pictures… I remember one part of it, there was this person who was laying out all of the plastics on the beach, and it would be like, hundreds of toothbrushes and little pieces of caps, and you’d be like “Hey! I use those!”

Samantha – Well, to be honest, like, some of them were actually pretty boring because just had to sit there. But, they still found ways to make them fun because there wasn’t like… it was two hours, right? Even one hour and twenty minutes, like a normal class setting, I would still find myself drifting off sometimes. But they made it interesting, because we actually got to get up. For example, the seaweed lab – there was a while of sitting there, but then afterwards we actually got to look at all of this seaweed. And, as I said before, the hands on experience. And, they did engage us because it was like… they… we had to present all our findings and stuff. And, I actually felt like I learned a lot more in those five days than I did
like, if it was just one school week – I felt like I learned a lot. Or just, one week of just sitting here at school, because they really made it interesting. The video on the dead seabirds put it into perspective.

Avery – I liked, um, most of the activities. Umm… except for the ones where I’d just sit down and watch slides. But uhh, the one activity that really was the best was um the tide pool activity. I was so happy to find the one tide pool that had like almost everything in it. There were two fishies, and a couple starfishes, a bunch of little sea anemones. And I stuck my finger in it and it stung me, so I love the feeling. Um, just… and the seaweed lab as well, cause ours was the best (red seaweed, yeah!). And the instructors there… were they instructors? The teachers were really good at explaining, and they seemed to know what they were doing all the time, and they just loved what they were doing as well it seemed. And that’s what I loved about this trip. What they taught was educational, but most importantly, very very fun, and full of new information that I never knew of.

With the seabird lab, umm, what they were telling us about the… how they ingest all the plastics, and all the things the things that they shouldn’t be eating, it made…the teacher there, she made it very clear to us that this is not… obviously, we know that this is not something that they should be eating, and er… she made us very aware of the situation, she made us very aware of what was going on. It made us all, like open our eyes and see that this is more important than we thought it was. They just spread more awareness.

Landon – Uh, I really liked the dredge ‘cause I thought what we pulled up was kind of interesting. And how when we went on the boat, we got to see the sea lions. In terms of some of the other stuff, I also really enjoyed the… creating the research proposal and learning about… the powerpoint that we saw about the mammals along the west coast. Uh, the one thing sometimes I didn’t really enjoy was… hmmm… sometimes, some of the stations, when we were in the whale lab, some of the stations, I just found weren’t as engaging as some of the other activities.

Chase – Umm, for the in class room ones, uhh, it sort of seemed like… it seems like the day activities, the outside activities were a lot more strenuous, so then we were tired when it came to the inside activities so we weren’t as captivated as we could have been. But then some of the indoor activities were pretty enjoyable as well, such as the titration. Then, so, I guess its like being with your peers as just friends, I guess, is enjoyable as well.

3. Have you reflected on your experience in Bamfield since you returned? If so, could you provide detail?

Addison – Reflect… like think about it? I have been thinking about it for a long time now, and I’m still thinking about it. Um… I think the things that I really remember, which are really vivid, are going to the beach and the experiment we did… the seaweed experiment, where we had to find the productivity of each algae, and the photosynthesis and things like
that. I also remember going to the beach and seeing a lot of anemones and we had to like, come up with our own performance. I also remember the walk in the forest. Oh, and going on the Alta and finding like… sea cucumbers.

Oh, I also remember the presentations… I also remember like, a lot of their lectures and, because they were like straightforward and really easy to understand.

**Caroline** – Yeah, I think it was fun doing like skits so like, when you’re like teaching the class, you’re not just talking and stuff. Umm, and I remember we did like the ride on the boat where we pulled up a bunch of stuff right from the ocean. And yeah, the beach walk too.

**Megan** – Yes I have [reflected], as I mentioned before. It made me think deeper about the world and like, current events in the environment. It helped me realize that I do like to study biology. Also, it further strengthened that idea that I want to become a biologist.

**Carlos** – The trip really inspired me in biology, but also, like, enjoying nature and I’ve just been appreciating that *that* is what nature would have been like. [Bamfields] a protected area, unlike here, and the people there are all like, really environmental and I actually want to be the same. Seriously, it made me really care about the environment and sustainability.

**Nicole** – It made me more down to Earth as it took me out of my everyday life in this crazy society where its all just about money. It reminded me that where I am, with like… buildings and everything, is not all that there will be in the future. Yeah, like… nature is our reality, not the commercialization.

**Elise** – I have reflected. I feel like this trip made me realize how humans have just like, exploited everything around us. Before humans came around, everything was in a balance. Humans have just ruined that. Like, there are so many species out there that are just, like, fighting every day for their survival, and everyone is just ignoring it and not taking into account the damage of the environment. I used to say I was ‘an environmentalist’ but to be honest, I would like, go and still buy microplastics and that bad stuff. But now, I know how much more conscious we have to be as our actions are damaging the environment.

**Chloe** – I think for me, the career panel *really* opened my eyes. Like, after I came back, I explored more of what I could do with a science degree. I think right after I came [home], I began watching a lot of documentaries and reading things online about the things we talked about in Bamfield. It has really, like, inspired me to pursue a career in science, biology, and like… conserving the environment. Also, it was really helpful to hear what they had to say about choosing a career in this field. I reflected a lot about my life in a way where I can try to not harm the environment as much.

**Karina** – After Bamfield, when we were returning on the bus back to Vancouver, umm, I couldn’t sleep so I just thought about like, day by day, like what we did and all that. And then, when we got home, I wrote in my journal about my experience… a lot. That’s what I do
for like, any major events in my life. I actually wrote a lot in the journal – more than usual. So I just talked about everything that we did, what we learned, funny stories, and stuff. And I still miss it.

**Dakota** – I feel like when we got back and everyone kept asking us about the trip, and like how it was, it made me think about how much fun we had and like, what we actually did during the trip. Since we took a lot of videos on our phone, like I would go through them and just like, think about what we did. Yeah, and like, how we actually made things fun, even though it was super educational, it was still like, really engaging.

**Jillian** – Yeah, I guess I’ve started thinking about like, it makes me want to think about my future and what I want to get into all over again. And like, just deciding what I want to get into after high school is a big one. And if I wanted to get into something like that, umm, kinda like, what field I would want to get in to.

**Erica** – I think it did change my view on the ocean. I thought of it like, oh the forest, like: great for the environment, because it is! But the ocean, its just there. It’s like 70% of our planet, its just there. But then when I heard like, what was it, like 60% of the oxygen was [from the ocean], it was just mind blowing! And we don’t care about our oceans, we… all our trash goes into it. Yet, it produces 60% of our oxygen, and we just don’t care! It was kind of mind blowing. Because, you see like signs “Oh, protect the forest, and that”, but you don’t see a lot of signs saying “Protect our ocean, stop throwing your trash in the ocean!”

**Samantha** – I second that. When I came back, I did think about it. I feel like, as soon as I started in the environment club [at our school], which was a while ago, I think that started like my whole “Oh, we definitely have to be more environmentally friendly”. Because, before I knew it, we have to recycle and all that, but after actually, you know helping the environment, it makes you stop and think about it. And, Bamfield did help, because the ocean is huge, and it takes up most of our planet, and if we don’t start doing stuff now, then we might never… we might never start. I guess people don’t of it as that bad because it’s so big, when in reality, it should be thought about because it’s so big.

**Avery** – When I came home from Bamfield, umm, I know that my family isn’t very environmentally friendly. We’re a big family, and we produce a lot of waste in one day than Bamfield would produce in a day because they’re really good at sorting. Um, well, I wouldn’t really want to blame my family for that, I just think that the… city council or whatever, mayor, (Gregor Robertson), is just not really putting it out there that we could recycle more or sort our trash. He’s not really explaining that well, so families that don’t really understand as much English like my family does – like we’re practically immigrants… well, my parents are, I’m just first generation, but still. There just needs to be more awareness for like, sorting everything, all your plastics to plastics, all your composts to composts, and try to be more sustainable that way. And maybe that way a lot more families could start to live a sustainable lifestyle. That’s kind of what I reflected on when I got back.
from Bamfield. Seeing how the chefs were making such green foods, and, knowing where to put their foods after that.

And also, away from that point, what I reflected on Bamfield as well was how when I’m here and I go to the beach, I like to pick up shells and I like to take them home and put them in plant pots. But, when I went to Bamfield, they were like “No, you can’t take it, you gotta leave it there, its nature, nature made it, nature wants it to stay and everything” I kinda thought about that, its like taking someone away from their home. Because you’d think like a little seashell, what’s it gonna do right?

**Landon** – Like just thought about it? Uh yeah, because, my sister who is in grade 10 right now, she also is really interested in going on this trip next year (if there is). So I was just kinda telling her and my family about the different experiences I had, learning with my friends, learning about the different organisms, and like seaweed and stuff. And, they just also found different information and stuff, I found was really interesting.

**Chase** – Like after returning, its just the moments that we stayed there are very, uhh… outstanding in my mind I guess? And also things about how… such a… such a place such as Bamfield is so quiet compared to cities such as Vancouver. And then, also, I think about the impacts of global warming on uhh the marine life around Bamfield, because you can’t really see it in Vancouver as much. Yes, I guess, in Vancouver you can just tell by the weather I guess, but nothing very stand out because we don’t see much wildlife in the urban areas.

4. While in Bamfield, how did you view yourself in relation to the environment around you?

**Addison** – How I felt when I was like, in the forest? I might have felt, like, inferior to… the… my surroundings because I have no idea like, what kind of organisms are there. And, I enjoyed a lot of things – I actually really enjoyed the view and Mother Nature, and the organisms that were there. And um, I get to see a lot of creatures in their habitat and observed them, and how they use their… how they adapt to their environment.

Umm… Oh, I did feel like… umm, how to explain this… umm, I’m not sure, but like, in the forest, I just felt like… I have to think how to explain this. I’m going to think on this some more.

Hmm, when I saw all these like, organisms and thinking about all of these things that humans are doing to the environment, like pollution and that, I just felt kind of sad… and like, we’re destroying the planet, you know? So I feel like, I feel kind of guilty doing this to organisms in their habitat.

We took everything for granted.

**Caroline** – Like, I guess, its cool to see like the diversity of all the different types of plants
and animals there. Mm, the trees were really tall so I guess it made me feel kind of small.

It seemed like the forest, and like comparing it to the city, we kind of destroyed everything.

**Megan** – Hmm… I guess smaller, but also more connected. Like, we are more connected to the environment than what we think we are, in a society where we are surrounded by like, buildings and so influenced by money. Hmm… it made me realize that there is so much more to nature and life. Yeah, we are just… more connected to nature.

**Carlos** – It was a very humbling experience to realize that “Oh, you’re just another species in the food chain, like, nothing special.” Humans always forget that. I think it’s very important for everyone to just like, go outside to see what the world was like for the past four billion years. Like, when I was watching the stars… like, whenever I see the stars, it reminds me just like, how small we are. This world is just another speck of dust in the universe. And this mindset is really important. You realize how dumb all our wars and conflicts are. Like, if everyone had this mindset, there would be a lot less wars and conflicts.

**Nicole** – Umm… it made me feel much more connected to nature. Like, it stripped down all the superficial and conceded ways of my everyday life. Yeah, like, it made me appreciate everything much more.

**Elise** – I felt insignificant, but also like, really important at the same time. We’re all in this together, all the species and organisms – everything on this planet is connected in some way. Like, when we’re gazing at the stars, even though we feel that we’re so great and people are fighting for power, we think this world revolves around us but it doesn’t. This trip made me realize that.

**Chloe** – At Bamfield, I actually felt like I was a lot smaller than if I was here. Here I just see like, human, human, human, human – I barely see anything natural. There, there is just… so much more to nature than what we perceive to be nature. For example, if we live in the city, or anywhere that’s developed, we think that nature is just like the trees, the sun, some fresh air, some water, but there’s so much more. At Bamfield, it’s so natural and like, so protected, but there’s still so many signs of human influence. Like, we still saw plastics, and things that humans invented.

I just feel like sometimes we should like, step back and look at how much we have influenced the world and reflect on how much we have changed the world and how we shouldn’t be doing that and like, how we should fix it. But like, not many people are doing that, so it’s kind of sad. I want to add a quote I saw in a movie: “When you look down from a mountaintop, if your influence is larger than what appears to be a grain of rice, then we should change our ways” because nature can’t handle that much and we need to be more conscious about our actions.
Karina – In Bamfield, I thought like… I didn’t think much of it, but then like two days in, I felt like a foreigner, cause like… in a different country, cause I didn’t know… Like, our instructors knew everything, they’re like “Oh yeah, the tsunami warning, do this and that.” I just didn’t know what to do like… I just felt so lost. But then I learned a lot which was the main part of the trip.

Dakota – I kind of feel like we’re destroying the Earth (laughs). It’s so like, peaceful, and like, once we got there, we didn’t see anybody else there, and it was just us. And then, whenever we were in the cafeteria, like when we went to put our plates in, there would be a lot dumped like in the garbage. And like how we were picking at plants while doing the walk.

Jillian – I mean, I love being out in nature, so it was a very, like it was a time where it was easy to think clearly. Umm, it really like, it was just a lot easy to make decisions and like just think clearer. And it, it made me want to connect with like, the outside more. I felt very in place while we were there, especially while we were on like, a boat. I felt really like, at home while I was on the water. Umm, like when we were on the hike, it was like… it made me feel more at home than I do normally in the city.

Erica – I think I felt like, part of nature in some sense. I felt like when we were stargazing, it was different than like, walking the forest I guess… when you walk in the forest you kinda feel like apart of nature, but then, stargazing was like… you kinda feel like you’re part of nature but you don’t actually know what you are. Because, it’s so big! And then, yet, you’re so small, then you care about yourself so much and you’re so selfish, and you don’t really care about anything other there. So yeah, I would say, a part of nature.

Samantha – This is when we went to the beach, when we had to go to the other side of the beach: when we were… when we were walking on the sand, because, it was perfectly perfect. Like, there was no disturbance, disruption. When we were walking on the sand, and we were making our footprints, I thought that like, I was intruding because it was so perfect and it seemed like we ruined that scenery. But over time, of course, it’ll go back to the way it was before, but for that moment, it felt like I was intruding because of the footsteps. I don’t know why, it was kind of weird.

When we were sitting there having our own reflection … I felt like I was part of nature. Because I listened to the waves crashing and I just… cause I drew a picture when I was standing there, and everyone just sitting there, enjoying it and we weren’t making any sounds. I did really feel like we were one with nature. I guess it was different when I was alone. So when we were sitting there, it felt relaxing and I felt like we really belonged.

Avery – I feel that I don’t have ownership over it, um, but I do know that I am part of it. Um, because it makes me feel like I’m in my safe place, it’s like… it makes me calm and in most times, happy. And, I know this because we’re not supposed to be living in urbanized areas
(cities)… instead, we’re supposed to be out in the forest, out in nature, just finding umm… hunting for our own food and making our own shelter, fighting for our own lives. And that way, I do feel like we are supposed to be part of the environment, cause these were our previous lives, well… ancestors’ lives… long ago.

**Landon** – Hmm… like in terms of environmental impact? I just felt… cause, living in the city is like a lot different than being in Bamfield. Because, in Bamfield, there’s a lot more forest surrounding you. I thought that was really nice, having a change in scenery and not being surrounded by all just metals and buildings.

Lets see, what else? I also just like enjoyed, just being more in nature, and just instead of the clean kind of building and everything. Just being able to see the different organisms that lived, and the plants that lived in Bamfield that I had never seen before, and learning about new things. I thought that was really interesting and I really enjoyed it.

I kind of felt more connected to the environment, yeah, because I wasn’t using like… or I feel like, when we were going for, especially on the nature walks, like, there wasn’t pavement and paths or cement everywhere, there’s just mud and stuff. And I thought that was… I felt more connected because it wasn’t just destroyed. Like, people hadn’t come to like just slash down the forest and set up a city. It was more natural.

**Chase** – Uhh, as an individual, it seems like the impact that you make is very miniscule, but when you look at people as a whole, the impact is just on another magnitude. So it feels like whenever, or, if you’re doing something uhh… green or I guess, sustainable, it doesn’t feel like you’re making that big of a difference.

So staying in Bamfield, uhh, while we were outdoors, it feels like you’re very connected. It’s very quiet so it gives you a lot of time to think about everything I guess.

5. What have you learned about your own beliefs while in Bamfield?

**Addison** – I think humans are actually really greedy. We just take everything from the environment, like “Oh yeah, we’re just going to build more houses.” Sometimes, we just don’t think about the environment. And umm… even though we’re trying to help the environment, and take care of pollution, it’s not really working because the mass majority of people aren’t contributing. And then, I mean the world can only provide us so much.

Money is nothing; it’s the same as toilet paper. Like why are we cutting down trees just for money?

Well, when I was little, I knew that there was like, a lot of plastic in the ocean and it’s not good, and like, a lot of animals died. But I didn’t know there would be a lot of animals who died.
Caroline – I think humans are destroying everything and polluting the Earth. Humans are greedy. I think humans are like, too concerned with money, even though it’s kind of something that we made up. And the effects on the fish and stuff… like in socials, we learned about like the cod industry thing, and how like, now they’re all gone, and it was just like the world’s richest fishing ground.

They talked about how the seabirds choked on plastic, and that’s our fault.

Megan – Hmm… I learned to be just more conscientious of what I do, like buying certain things. I think it made me realize that I want to help nature more. I want to be more connected and conserve. Like… I don’t know how to word it, but the feeling is there. For example, that fish lecture, it made me realize just how big the issues are and that I really just want to change it.

Carlos – I don’t know if it’s a belief, but I just found how happy I am in nature. Like, I just want to pursue a career where I’m in nature.

Nicole – Yeah, it definitely confirmed my belief that the best and most unique joy is like, when you’re surrounded by nature and you can take everything in.

Elise – Before I went to Bamfield, my sister and I kept talking about living a minimalistic lifestyle. But like, we never got around to it because we still live with our parents and thought it wouldn’t work out. But after going to Bamfield, it strengthened that my belief that living minimally can actually make a difference because you’re not exploiting as many resources and you actually think about the mark that you’re making on the world.

Chloe – It made me open my eyes a little bit more. Before Bamfield, a lot of us students would focus on like, superficial things, like getting good grades or get into university instead of the things that actually matter. But Bamfield made me actually focus on the present. It made me think not just about marks and grades and school, but like, the bigger picture. Even if we don’t get an A on that essay, just to really appreciate nature and the people we’re surrounded with. To live every moment to it’s fullest.

Karina – I think seeing Bamfield and going into like, nature and the wild, it like…it like strengthened my belief that we need to change like the planet for the good. Climate change, and all that, like reduce the emission of greenhouse gases. I just believed in like evolution more – (because of the) Douglas fir thing and the first nations stories about the pinecones.

Dakota – I don’t think it changed. I think like… I already like was informed about how bad it was. In our leaders program here, we talked about it a lot and we did a huge project on it so I knew it like was already super super bad. So like, going to Bamfield just further proved it.

Jillian – It made me like, think all over again how lucky we are to live where we are and how important it is to like, umm, like treasure what we have and not exploit our like, world
more than we need to. And it made me… I don’t know… it made me, like, seeing the people there, especially like the researchers and everything, made me believe more in certain groups of society. It made me really think more that there are things that we could do to help and ways that we can still research and find more about our world without damaging it.

**Erica** – My belief for protecting the environment, I guess it made it more stronger; protecting the oceans, and I believe in like, learning outside and like, experiencing things is better than sitting in a classroom and taking notes. And yeah, we did that in Bamfield and I think that made my belief in that stronger.

**Samantha** – Well, when I was younger, I didn’t care and… I know, that’s so bad but… when you’re younger, you really don’t know about these things until you get older. And, being here at [our school] and joining the environment club and then going to Bamfield, it made me realize just how important saving the whole Earth is. And, I guess my beliefs did change, even before going to Bamfield, because the more you know, the more awareness you gain and makes you really want to do something. Instead of just letting it go, but actually going up to someone and saying, “Hey that doesn’t go in there, it goes in here.”

**Avery** – For me, I like to relate everything to Christianity for some reason. I feel like, when the sun comes out, its God who is giving us light, and who wants us to be happy. Umm, and well, when the rain comes, its just like “This is God, well you’re supposed to be sad today, whatever or…” Of course not, but no… bringing like… just like science, I relate God with science a lot, I don’t know why. I guess that’s what the church did to me. But, umm, whenever I see fishies… fish… in like the ocean, its God trying to tell me that… fish is being fruitful, they’re going everywhere, or there’s a bunch of them.

Umm, I don’t think that Bamfield really made me… made me teach me about my own beliefs, it was kind of more about that… I felt like I was being drawn away from God a little bit because everything was being centered around science and how evolution created everything. And I do believe that evolution created everything. It’s just God is a figure that I keep in my mind a lot because that’s what I’ve taught since I was born. And um… I do believe in evolution and um, and well, being in Bamfield, Bamfield really did umm, explain a lot about, well, answered some of my question of evolution for me. And, I felt like they confirmed a lot more for me than what I would find out by myself or online – cause, they know this, they’ve been in this environment for longer than I have ever been.

**Landon** – Well in terms of just how I live, I feel kind of more guilty now that I use so much plastic after, cause on the day we left, we did the seabirds lab and then just like seeing how much plastic was in seabirds stomachs, it kinda made me… it kinda opened my eyes. And then the other day, I was just talking with my friends, and I kinda said how much do you wanna bet that there’s plastic and stuff inside of that seagull’s stomach. It kinda made me feel more guilty about kinda just buying and selling everything.
Chase – Umm, I kind of discovered that my goal I guess for when I want to settle down is to live in a more rural area. I don’t really like the fast urban life, I guess, as much as the almost isolated rural areas.

I think my beliefs stayed similar… well they’re similar to what they were before, like, uhh, I think uhh… climate change is just as big as an impact as it was before, but I guess I didn’t realize how much it affected the areas that I wasn’t just living in myself. Or, the areas that I don’t live in, the ones that I don’t learn about in school.

6. Has anything that happened in Bamfield – within the planned sessions or informal activities – prompted you to change the way you think or feel about the environment?

Addison – Yes. I’ve learned that a lot of species are becoming extinct because of humans. Umm, now we’re trying to like… in my daily life, I’m trying to use more environmentally friendly products.

Caroline – I feel like everyone uses plastic and there’s plastic everywhere even though it’s bad for the environment.

Megan – For sure. For me, before when we were learning about sea stars, I was like “Okay, whatever, I can see them in Nemo and don’t really care about them.” In Bamfield, I got to see them and like, touch them and see them move and that was really cool. Looking at all the animals we don’t see everyday and how important they are. Hmm, like, the environment, how important it is to us, we need to start making a difference in the world. It just made me feel much more connected to the environment. I felt much closer to nature.

With phones, we never live in the moment, like I remember going to concerts where everyone videotaped it. Like, why can’t you just put down your phone and actually live in the moment?

I feel like the Internet connects us, and also like, connects the world… you have the world at your fingertips basically. You can search up anything. The Internet allows us to have the world at our fingertips that helps with some things. But, we spend too much on the negative side of things.

School may be boring because its so test oriented. And there’s barely any practical things to do…

Carlos – The whole experience, like, being in nature, it makes you realize you’re just like another wave in the ocean. All the superficial stuff we worry about, it doesn’t really matter. It was also nice to get away from our phones for a while. All this stuff, social media, phones, they make you more depressed in a way. The happiest I’ve ever been was in nature there. Nature is where we belong.
But on the bus, everyone just kinda has like, headphones on, everywhere you go, texting, its like… and there, in Bamfield, I just feel like everyone was just looking out for each other and saying hi to each other and just seeing each other.

We evolved in nature obviously, so that’s kinda where we belong. And this whole like society it’s just relatively new. And like phones and everything so… I don’t know, it’s not natural, it’s superficial.

I actually deleted my Snapchat. Cause like, everywhere people go, they’re not actually living in the moment… they’re just trying to show that shit off to their friends, like ‘Oh, look how much fun I’m having at this party.’ But like, they don’t actually have fun – they just act like they’re having fun, showing off how cool we are.

The Internet has the potential to make the smart people smarter because they restrict their access and dumb people dumber cause they’ll just waste their time watching stupid things on the internet… like, it can take some people who have potential and just get distracted but, there’s a certain limit. Its like a test of what you… really care about. Dumb YouTube videos for hours on end, it wastes your time. Or you could watch documentaries for free…

“Nothings gonna change unless someone cares an awful lot about something… ” [Quoting The Lorax]

Nicole – Prior to Bamfield, I did for sure have a good view towards the environment and conservation. I really got into it in the beginning of grade 10. In Bamfield, all the activities, like holding a sea star or being on the Alta and seeing the sun, clouds, looking at everything from a diff perspective, it made me appreciate everything more.

There, seeing everyone without their phones – and actually enjoying it! Phones are inevitable here… I would have been so much happier if I grew up without technology. It takes away from actually living, and feeling, and everything.

You lose your sense of focus, in every, and like, in school even.

One of my favourite things we did in, or what my favourite feelings we had in Bamfield was the Rix A, is that what its called? Every time you got in there, you had to take your shoes off, and it just felt… and I actually wanted to learn and it made me more comfortable. I just… I think it would be a perfect thing to do at like… in school.

Elise – It made me realize how beautiful and exotic the environment is. For example, the bioluminescence, I ever knew that if you just walked on a dock, if you swirled the dock, you could see the bright bioluminescence light up the water. Sometimes students and people in general just need to take some time off, relax, and appreciate nature. It was an opportunity to get away from phones, which are so dominating in our life. Back in the day, we used to actually go out at recess and play with our friends. People are on their phones 24/7.
[With phones]: what are you supposed to do? Celebrate your birthday. But what do you end up doing? Taking selfies with your phone.

Also, I have friends who are just like, on their phones in the classroom, and they’re just like… you’re here to study but you’re on your phone looking at memes. That’s such a disconnect. Like, why would you go to school and just be on your phone, you could do that at home, you know?

**Chloe** – Umm… well like, even before Bamfield, I feel like I was pretty interested in the environment and I changed aspects of my lifestyle to like, that I believe will help the environment. But after going to Bamfield, I feel like its given me even more… I guess…like, its given me more validation to just going and do even more than what I’ve being doing to help the environment. And I think… I think its also inspired me to kind of spread the message a little, like, to tell people that their actions actually do affect the world in a whole sense. And that maybe if you do change a little bit of your lifestyle at a time, you can make, you can change the world. And like, a really good quote that I’ve heard is that “a movement doesn’t just start out of the blue. It starts from someone who believes in change.” So that, if every one of us believes that we can change something, in the end, we can because everyone is united, and we can just… the movement will help the environment.

Everyone needs to learn from that story [The Lorax]? It’s like… real life! It’s actually happening! The Lorax is actually happening.

If you walk down the street, I see someone our age, they have earphones plugged in. I see someone older, they turn around, look at me, smile and say “Hi, good morning.” There’s such a generation shift, and like, it’s so different.

**Karina** – Basically, like when we were at Brady’s Beach, I just looked around and there were no buildings except for that Brady’s Loo. I realized that humans like need shelter and buildings to do their stuff, like we can’t just… we need it, its not like we want it. Like this building we’re in… it’s not like we could learn in the grass. We need all this materialistic stuff. I just felt bad cause like… and like when we did the seabirds activity with the pollution in the water, the plastic pollution, there’s just so much that’s going on in the ocean and I didn’t realize it. Like, it’s rarely talked about in the news or whatever.

**Dakota** – It kinda just showed how everything is really industrialized now. Like how when we came back to Vancouver, we just saw a bunch of buildings and everything, but when we were at Bamfield there was like four buildings, but lots of grass and trees and those things.

**Jillian** – The reflection times, or the times that we were able to like explore, like the ocean, where we were able to like see the tide pools and everything, made me realize how… like, I already knew that our oceans were so insanely detailed, and there were so many things that we don’t know about it… but it just made me realize how much potential in our ocean and
we’re slowly destroying it by taking more things out of it.

**Erica** – I care more about seabirds now than I did before. I didn’t really know what seabirds were, or how important they were to our environment and I learned a lot about that. And, yeah, also about oceans, I didn’t know a lot about oceans and I didn’t know how important they were to the environment and now I do know that they’re very important. I didn’t know that before. I guess recycling; you know when you throw something in the garbage, it may end up in the oceans and that kills animals, birds, and the organisms that live there. Just… thinking more about the oceans… and its kind of cool how like, the environment interacts on land and in the ocean, like the aquatic environments, they all interact with each other. And if you kill one environment, the others won’t live for long because everything depends on one another. Yeah, we depend on it too.

I feel like, now that I think more about like, there’s people who never go out in the environment and live in big cities and all, like New York and stuff like that, they never learn, like, they never go on field trips like we do. And, I don’t know, they might like, “Oh, climate change is not real”, they don’t see it, they don’t experience it, right? So, they don’t understand how important it is because they don’t actually see the impact, like on them, because a lot of people only care about themself and they’re like “Well, it’s not affecting me, I don’t see it affecting anybody, it might, so it’s false, it’s not real.”

**Samantha** – Well, compared to the whole nature and everything around us, I don’t know why, but I guess I’ve been thinking, like, why do humans even exist if we bring so much devastation and damage to the environment around us? But then again, we’ve also helped and even though we do make mistakes, there are people out there that are trying to fix our ways. There are so many people, billions of us, that don’t even know why the ocean is so important. And after going to Bamfield, you really, I guess, you really understand why you know, protecting the environment is so important. We basically rely on it, and if we can’t fix our ways or even convert it to being more sustainable, there’s no way that we can survive if we all… there’s billions of us, and every day, there’s only like so much damage one person can do. And if we don’t fix our ways, we’re pretty screwed. But we are working on it, and a lot of us, after going to Bamfield, we realized that “Oh, this is important and we have to do something before things go wrong.” If only one person does care, I feel like that would make a big difference.

Even though we learn it, like, I learn about you know, how important the ocean is at school, but it never really hits you in the face until you actually go out there and see it for yourself. You hear all that, but you never actually see it. So Bamfield is good for that too actually, its hands on.

**Avery** – Well, I already knew this before, but, because I did a project on coral reefs, and when we did that lab on the coral reefs, there were some sea anemones that we couldn’t touch and that you could touch. And, umm, so, I kinda thought like, that there’s a lot of coral
reef fishing, well, hunting… coral reef hunting and that happens along the great barrier reef (Australia) and Malaysia. And, um, I know there are a lot of uhh what do you call, those… like NOAA (I don’t know if you have heard, like N, O, A, A), they’ve really been trying to restore um, coral reefs. And, it makes me kind of want to join their team and go like down scuba diving to go make like, artificial coral reef habitats for them to regrow. And, so, ever since the lab, I kind of… I’ve been more like, aware of the situation a lot more, like you can’t touch this can’t touch that, they’re really delicate. And for example, the sea cucumbers, how if you like handle them for too long they eviscerate. Yeah, and I’m just thinking, like all those, err, nets [trawling, dredging] that they slide across the ocean floor just to catch fishes, they also catch a lot of other animals, they named that like by-catch, and that that stresses them out and hurts them too. That’s what prompted me to feel and think the way that I think about the environment.

Landon - Uh yeah, about how I just said, like plastic and birds. What else? The fact that … I feel like we shouldn’t use like so many natural resources because we’re like… to build cities, we cut down huge amounts of forests and clear cutting. And when we were driving on the bus, that really long bus ride and we drove past all the clear cuts, it made me think about what that forest used to be and all the organisms and different animals that used to live there before it was cut down… it made me a little sad I guess, just thinking about what it used to be compared to what it was now.

Chase – I guess a lot more could be done… concerning the environment. I guess its just like starting up these sustainable practices are… unappealing to the like “One Percent” I guess, the ones who dictate like our economy and ultimately dictate how most of us live our lives, I guess.

7. If the way you think about the environment has changed since the Bamfield trip, what do you think led to the change?

Addison – I’m not sure, but I think my views stayed the same as before. I knew there was like so much pollution in the air and it’s affecting so many countries and the environment.

Caroline – Everyone always says, “Global warming!” and like, how, that we need to change our environment… and like how everyone’s like, the humans are polluting the environment and everything. But I guess being there, because it’s so different from the city, like where you stay and where you eat, I don’t know, I guess it strengthens the belief… that humans are like… should change how they treat the environment.

Megan – Like, what we said, the star experience, and also, umm… being so close to nature. Being able to touch nature, breathe it, see it, all that stuff… It gives you goose bumps just thinking about it.

When we think of animals, like the mainstream animals, cats, dogs, and all those things and
other things, we don’t think about the small things like, bees, snails, planarians, planktons. All those small things but that play such a gigantic role, we don’t give them enough credit for it. We just pass them by.

Carlos – I just think… being in nature and being super happy, and being more happy than I am normally when I’m in like the first world here… the developed world. And yeah, just realizing that that’s where I belong, and that’s where I’m happiest, that’s kinda like my passion…

If all humans were just taken out, the world would survive. But if say like, all the bees were taken out, we wouldn’t survive. Like, if all these little keystone animals, if they were taken out, there would be collapse.

All we’re better at than the other animals is destroying the environment.

Nicole – Being in nature was… it just, nature in itself, umm… just made me kind of… I don’t know, like, but yeah, realize as well that I’m happiest there. And the stars were just very humbling and just… uhh… yeah, talking about it, and just speaking to people who are like, connected with nature and want to talk to you about things that matter, its just a beautiful thing. You see that little the sparkle in their eye… yeah, that could be me.

Elise – I think the whole experience, like being in nature and being able to study in nature, the bioluminescence, the stars, like, it all changed, it all played a part in changing how I thought about the environment. Because, I feel like I have a new respect and appreciation for the environment.

And also, if you think about it, if we were stripped down to like, just our barely anything, if we only had our hands and our feet and our mind, like we would be nothing, like if in the face of a lion or even in the face of like a sea lion, we would still be probably dead…Even the lowest of predators. Like, we would cry in front of a crow. Like insects, they can like eat us alive…

We don’t have a set predator and we don’t have a set prey.

Like, you know how people they’re like “Oh, what’s the meaning of life” Like, what is the meaning of life? Logically speaking, just reproduce. And like, we’re supposed to survive, but not in this way, you know?

Chloe – Being at Bamfield, it just… it really humbled me I guess, and it made me kind of view the world in a way where humans aren’t the most important. Umm, and after coming back, every time I look at a bee, or a snail, or any other small creature that’s like… so many times smaller than us, I think and… I look at them and think ‘Wow, humans are really insignificant as like, as a species.” Like, bees and snails, insects, they all do so much more for nature and for the planet than we do. Like, they are actually trying to help and we’re
ruining everything, including their lives.

Yeah, and like… I think it’s just changed my view of what we are to the planet, like we’re really insignificant and if one day mother nature decided to throw a huge earthquake or hurricane, err, we would have no way to respond. And we’re still just… we’re a part of nature, but like, I think a lot of powerful people throughout history think “Oh, we’re better than nature. Like, we can change it, we can do our will.” But no, at the end of the day, I think what I’ve learned is that we’re still just part of the whole, and we can’t really escape that. Like, we still have to play by the rules or we’re not going to survive.

Like what we watched on sharks, they’re like so magnificent but really… like, they’re not evil. They’re just… They’re just doing what they’re doing to survive, and have like, all the aspects of a top predator. Like if you compare us to a shark, or a lion, or any of the top predators, we have like nothing… We don’t have enough hair. But we hunt them! We think we’re better than sharks just because we can invent things with metal. But we’re not… like, put us back to nature.

We’ve exploited the world to such a degree that I’m pretty sure in a few more years, it’ll be irreversible. Absolutely irreversible. And like, all our efforts of doing something good has been to our own species. Like we haven’t really served anything else… we haven’t tried to help another species. Like, the only way we try to help is by like… reprimanding what we have done to them. “We’ll help you out because we killed you off before.”

**Karina** – Going into Bamfield, I already like, was aware of like, global warming and stuff. So then when we did all those activities, it kinda, like triggered me like thinking that we need to stop fast. Everything is going too fast. We really need to slow it down. And there’s… and like… Learning about the oil sands in like Socials and whatever, we’re just completely destroying a huge like… massive land, and its kind of sad because like, there’s so many organisms and like, with like, their own specific niche that just gets destroyed – there’s probably no way of getting that back. Just because humans need this for money – like, everything is just about money nowadays. Going to Bamfield made me really realize that its not just about like money and profit.

**Dakota** – Like, humans being more needy and being like, trying to make the world easier but not realizing that they’re actually wrecking it for other living things. And like, they think they need so many things, like, I probably think I need a phone but I really don’t. Thinking as like, things we don’t need as essentials.

**Jillian** – I guess like, the opportunity to like see our like, ocean and our nature just from a different point of view and a different way of learning about it. It was very hands on and umm; you were always learning something even when you thought you weren’t learning something.
**Erica** – I think… going to the beach and seeing the tidal pools with *so much life in them, so much biodiversity*, and we just think, we don’t have this here in Vancouver because just because there’s so many people. It kinda… I don’t know. It made me aware. And also, in the seabirds lab, where we saw the dead seabirds, like you see pictures on the internet, birds full of plastics and stuff, but when you touch one, you’re like “*Oh, this bird died*” – not because of plastics but because it had plastics in it – and it lives in the Bamfield area, and its so clean! And there’s no big boats around, and not a lot of people, and it *still* has plastic in it. That was… that was…like, it was *mind changing*. It was *mind blowing*.

We have food… I don’t know if it’s enough, but, we have plenty of food for the world but we just don’t know how to use it. And, animal agriculture takes up *tons* of space and *tons* of water and food. The way we do things is *not* sustainable.

**Samantha** – I just feel like, its just… being there and seeing everything in action, like seeing all the sea cucumbers, and everything in the touch tank, and seeing all that biodiversity in that small little tub… you know? I feel like, actually just being there, not even doing anything, just looking at the ocean and seeing how big it is, and in the grand scheme of things… it really makes you… if you just sit there and look at it, right? It’s deep.

**Avery** – That night when we saw the dinoflagellates, umm, I thought, “*Wow that is what I’m going to see here in Bamfield, this is so cool – obviously I’m not going to see this at home.*” I was just really mind blown and just very surprised and excited and everything was so beautiful. And, just seeing the colours that would shine when you would wave the paddle or wave our hand in the water – it just kind of made me feel very at peace. It made me think like “*Yeah, we don’t have this at home,*” cause we have urbanized the area, umm, there are a lot of spills in the water that probably killed all them – most of them, actually. And, I am thinking “*Well, its so unfair how we have to go to such a far place just to see what Vancouver was like long ago way before it was industrialized – like, how come we can’t we see it here?*”

I think there needs to be *way* more awareness than now, so then people like now and forever on will be able to see what we got to see in Bamfield. I don’t want it to just be in one enclosed area, like, I want it to be everywhere, it needs to regrow and repopulate, and everyone should be able to stars under the sky, and like, be able to experience a supernova, 12 stars passing by too.

There needs to be *way* more Earth days and blackouts. I just think that, like, electricity: we don’t need that much. In Bamfield, we didn’t need that much – and everyone still made it alive, walked on the dock, and no one jumped into the water, there was enough light.

When we went to the ocean, or, went to the beach, practically ocean, I was just thinking about the water a lot and how much I use at home… and I know that I take half an hour showers, and that’s like, just, really really devastating for our bill and more importantly for
the environment. There needs to be better shower systems, like one of those push on it and it goes on for one minute because that’s all you need, pretty much.

There needs to be like, better… way more awareness, we need a lot more awareness I believe. Because, not a lot of people know just how much water consumption they use in a day, how much food they waste in a day. Even in the city alone. I don’t know the numbers, but it’s probably around a hundred thousand eggs a day.

I’ve seen like, these information videos, its like… they show how they would take out all like the apples, or fruits, that didn’t look identical to the rest, the ones that looks like that they have an extra little lump inside even though its all the same, and how much food was wasted from that. And then after that, when you take those the market, you see how much is wasted after that because it would go bad. Its kind of mind blowing because you could make a whole lot of fricken pies with that!

All those people that say there’s not enough food for the world, well, there is; we just don’t know how to distribute it. And also, there’s some religions where there’s like, they toss meat out on Friday…and I do believe religions are very important to cultures and everything, and to people, but um, I do have a slight problem with it when it become unsustainable. I do know for a fact that one of my friends, his culture, has thrown meat out on Fridays because of some superstition. Even if they buy the meat the day before, its all gone. Awareness is key!

**Landon -** I think that a lot of people who live in the city don’t usually get out much because they work in the city, they live in the city, and you don’t really get to see anything outside of the city. But if you do get the experience to go and look outside of the city and just see nature and like, the forest and the sea, it kinda opens your eyes to like maybe… like the idea of just consuming, consuming it and throwing out what’s left after, its just like, not a good idea because it just creates more and more garbage and more and more like, landfills, it fills more and more landfills. Eventually when the landfills fill up, we will just have to find more space. So maybe we shouldn’t always just throw away whatever you use, you should always try to reuse it, I guess.

**Chase –** Seeing the impact of the, or, uh, what humans do to the environment. Like, such as the lab with the seabirds. That was shocking to see, I guess. And I guess very important at the same time. And I guess most of what we saw [at Bamfield] was relatively clean, so yeah, if you compare that to what we see in Vancouver, it’s a lot different.

8. Can you tell me the most important thing that you’ve told me today?

**Addison –** Humans are greedy. They’re so greedy. I want to be a sea cucumber. Wait no! Humans eat sea cucumbers. Umm, also, we really have to change our ways, like, just because a little bit of the portion of the human population is doing something to change the Earth, to help the environment, it doesn’t mean its actually helping because every single person has to
do it.

For example, they’ll say how yeah, like “cars are also polluting the world,” but then they take their car to school.

**Caroline** – A lot of people, like, know what is wrong with the environment, but they’re not doing anything about it.

**Megan** – What we did there was learn. And that is what is what inspired us to say the things that we’re saying now. To like, help the environment, to become more one with nature. And so I think the most important thing that encompasses everything that we’ve said is educating ourselves, because that’s what leads us to umm… changing things, to like, talking like this and one day, maybe changing the world somehow. So, I think education and like, teaching others is so important. And just, the Bamfield trip umm, to teach us in such a practical way, and such an engaging way, was very memorable.

We need to find ways to live sustainably, with the quality of life that we have right now, so that our grandchildren can live like this… so that the next 100 years will be different, much better.

**Carlos** – Just that, in nature is where me and like my peers, everyone that I’ve talked to, say that we’re the happiest. And like, if we want to continue experiencing happiness, we have to conserve nature so that we can continue to experience it. And then, I just realized that when you’re there, that everything doesn’t really matter, again with the stars, you realize how small you are, and that everything that you really worry about doesn’t really matter in the grand scheme of things. And that this superficial world that we think is so important, and we think we are so important, that doesn’t actually matter in the, compared to the world, and the universe.

**Nicole** – Umm, so I think that there is no better way than to be in nature to be able, or, to reach such a high point of like… real happiness with everything, with the Earth, with nature, with yourself. And realizing who you are, and just… with your whole surroundings. And I guess you have a… it makes you see the world in a different way.

**Elise** – I think the most important thing, for me at least to take away from this whole experience, is that we need to be more conscious of what we’re doing to the planet around us, and also the environment around us. And we can’t just be selfish and think the world revolves around us. And we actually have to care about, like, our surrounding if we want to like live on the Earth for another ten million years. We’re the only species in the world that’s living like this, and its unsustainable.

And also, I hope that people take into account how like, we’re treating each other and how we treat other species and not just ourselves, and actually like… embrace our humanity since that’s what we take pride in.
**Chloe** – I think the most important thing that I’ve learned is that we’re actually just a really small part of like… of a huge planet, and that maybe sometimes, we can just reflect on our actions and think about our little actions as something big that will affect the world, and that might cause change in some people, and that change could be good. Or it could be bad… but at least there’s change. And also, just to like, appreciate the things that we have right now. Because, if we’re going at the pace that we are right now, with the way that we’re treating nature and our planet, umm… I really doubt that our great grandchildren or even our grandchildren will be able to experience what we’ve experienced in Bamfield. So I just hope that we really cherish what we have right now and try to preserve it as best as we can before it disappears. Cause like, I’ve heard my parents or my grandparents say that they’ve eaten food that tasted so good, like now, its gone because of the way that our agriculture industry has changed. Like… the flavor of food has changed. But I just hope that the later generations can look our mistakes and maybe fix it I guess.

**Karina** – Like the fact that we know what’s going on and that… the thing is that we’re more aware of what’s going on in the ecosystems and the human impacts of like industrialization. Us being able to like, learn lots at Bamfield was I think pretty important because if we didn’t learn something, there would be no point in us going. When I say learn something, I mean not like what they’re teaching us in those slideshows, but like, something that we learned about ourselves and about the environment.

**Dakota** – At Bamfield, like, it was really quite and peaceful. And like, when we went on the nature walks, it made me realize that there’s not that many places like that are like here now because its all been industrialized where some people just want lots of money. It kinda made me realize that’s the most important thing.

Oh yeah, and like, It made me realize that even if we want to make money, if we ruin the world, like right now, there’s not even going to be a use for all the money – were just going to be spending all our money on trying to save the world.

**Jillian** – The most important thing, I think is, how we need to like, treasure what we have and learn more about it before we destroy it completely. We have been slowly destroying everything. And we need to find more ethical ways of discovering more about what we have. And, right now, instead of… right now, a lot of the ways were learning things, it seems that we’re destroying things as were figuring things out, so its hard and its extremely hard to find new things, but we need to find a less damaging way of researching.

**Erica** – People need to go out more into nature and experience it. I think we learn more from experiences than learning about it in class. And, even if you don’t want to learn about it, just go out there and experience it for yourself, because I think its important. Like, to see nature, because if you live in a city and you’re all surrounded by it, you don’t really know what’s outside it or anything that lives outside it, and you won’t really care.
Being out in nature, you think less about yourself and more about the surroundings. When you’re in the city, you don’t really think about the environment because you don’t really see it. When you’re out in nature, and you throw something in the garbage can, you’re like “Oh where is that going to go?” But, when you do that in a city and there’s cars around you and you throw a piece of paper in the garbage or something, it’s just… I feel like it’s different.

It’s like technology, so the older people need to learn. Like consumerism, they learned that. They don’t go on field trips, go to school, like new generations. I think older people should go on trips too so they can learn. Children are similar to parents, if parents say “just throw this away” then children will say OK. Teach parents too! How people say “One person can change the world”, yeah I believe in that, if everybody started eating green and stopped eating meat and we all were more environmentally friendly – but if people are like “if I do it, it won’t change anything”

Samantha – I feel that people, we as humans are capable of change, and that we are making this world a better place. But there are a lot of people out there that still don’t know… awareness is key. And it’s true that we all have to go out more to see nature for ourselves. But I feel like we’re sophisticated people, and we’re all intelligent. I saw this video where there was a scientist who made fungus that could eat up plastic, it was so cool. That’s an example of why I think that people can change but its hard because the way we’ve grown up, it’s all like “Okay, yeah we take long showers and we’re used to wasting electricity and water and food and everything like that, so it’s hard to change,” but here’s a quote from Dr. Seuss: “Unless someone like you cares a whole awful lot, nothings going to get better, its not.” The Lorax. I think that really relates. Just getting out there and experiencing things, not just sitting in a classroom and… you can do it! If you want to start a sustainable lifestyle, I feel like people have the ability to change their ways.

I volunteered as a sustainability ambassador on Granville Island. A lot of volunteers didn’t know where to throw their napkins. I thought it was obvious, but I suppose I learned this in school and in my experiences. I guess being an adult, they didn’t know that. I was surprised; I thought they were supposed to be smarter and more wise. There were people who knew, but people who didn’t. You can help by teaching the adults – they will say “Oh I remember this girl, she said not to throw it there.”

Avery – I don’t think I mentioned this, but like um, uh, outdoor classrooms are very important. Like, how kids are left, or students are just… most of their time is indoors and they learn about the environment indoors, which is ironic – we have benches outside. We should totally take our class out and learn about the environment outside, or discuss about social studies or English outside, read a book outside. I know for a fact that, like, there are poets, like very very very famous poets or writers, who go outside and they were influenced by their surroundings. And, that’s how they make such great pieces, just by looking out the window or sitting outside by a tree, and just watching birds fly by, eagles soar. And um, by doing this, yes, of course I’m trying to advertise awareness again. But, they will understand
like Chemistry a lot more. Say, if you do an experiment out in the garden and uh, you do different acidity levels in soil, its all hands on and all the kids will have fun and learn at the same time. That way, they will feel more a part of nature as well and that they do belong to Mother Earth. And that more than Mother Earth would take care of us, we should take care of her as well.

When adults were our age, this whole recycling and compost system wasn’t around. It’s all very new. It’s good that they’re starting now. When we have kids, we can teach younger kids and be a part of environmental organizations and senior environmentalist clubs. We can teach all the children that what we learned when we were teenagers, that way there will be more spreading of awareness of the environment.

**Landon** – Uhh, most important… the fact that I’ve changed my beliefs. Yeah, I think that’s the most important part of learning. Cause that, sure, you can learn about all this information, but in the end it depends on what are you going to do with the information, are you just going to like sit there, or are you going to like change the way you live and the way you see things?

**Chase** – I think there could, or, I think we can do more about the environment than we actually think we can. Yeah, so, I guess on a small scale, uhh, small initiatives can lead to greater impacts. Sort of like a drop in a large sea. I guess with the sustainable practices, there has to be a trade off with what we’re doing today. I guess that we may not live as… well, not live as luxurious as we do now, as in just use one thing and throw it away immediately. Rather, use things for the long term I guess.