LISTENING TO CHILDREN:
PERCEPTIONS OF NATURE AND BIOPHILIA
AT MOUNTAIN EXPLORATIONS

by

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

DOCTOR OF PHILOSOPHY

in

The Faculty of Graduate Studies

(Curriculum Studies)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

July 2009

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Abstract

Biophilia provides a critical framework to assess the themes and impacts of an environmental education program. The intent of this exploratory study is to investigate children’s perceptions and experiences of nature during a residential outdoor environmental education program. The study intends to contribute to an understanding of how nature experiences arouse biophilia (love of life and living things). Using qualitative interviews, naturalistic observation and artifact collection, I studied children’s responses to nature during and following their participation in a residential environmental education program known as Mountain Explorations. I explored how biophilia can help researchers and educators focus on the vital intersection between individual, environment and action. Since biophilia demands a consideration of what it means to include the larger biotic community in our discussion of educational reform, this research will contribute to our evolving understanding of the relationship between people and the natural world.
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Terms of Reference

I use a number of terms in this dissertation that I define in this section.

*Anthropocentric*: Regarding humans as preeminent leads to a human-centeredness that is believed by some scholars to be the central problem in environmental philosophy. Anthropocentrism is used to draw attention to a systematic bias in traditional Western attitudes to the non-human world (Naess, 1973).

*Biocentrism*: A belief that all forms of life have intrinsic value. In this view, humans are part of nature not the center of existence.

*Biophilia*: Strictly speaking, biophilia is the love of life or living nature (Soule, 1992). E.O. Wilson describes biophilia as the “innate tendency to focus on life and lifelike processes” (Wilson, 1984, p. 1).

*Cascadia*: Cascadia is an ecological bioregion that includes the watersheds that flow into the Pacific Ocean through North America's temperate rainforest zone; the entire watershed of the Columbia River, as well as the Cascade Range from Northern California well into Canada (J. C. Miles, 1996).

*Environmental Education*: Environmental Education is education that teaches about ecological and social systems, and provides a real-world context for learning by linking the classroom to the students' community. Environmental education acknowledges that understanding the feelings, values, attitudes, and perceptions lies at the heart of environmental issues (ASAD, 2008).

*Charismatic megafauna*: A popular term, charismatic megafauna refers to vertebrates that are big, beautiful, and culturally significant. Bears and other charismatic megafauna can be viewed as “umbrella” species for the wider appreciation of natural areas and the
development of sustainable solutions for our planet’s humans and wildlife (Morgan, 2008).

Ecocentrism: As a philosophy, ecocentrism recognizes the dependence of life on the entire ecosystem as opposed to a more human centered system of values.

Foodshed: Just as watersheds define the flow of water supplying a particular area, foodsheds outline the flow of food that feeds a particular community. A foodshed encompasses the farm, dinner table and everything in between (Foodroutes, 2003).

Natural History: As an inherently interdisciplinary field, Natural History tells the story of our living earth involving direct observation of the interdependence of life. By helping to shape communities and individuals the study of Natural History is viewed as providing deeper insights into our relationships with other beings and the places we inhabit (AAAS, 2007; NHN, 2008).

Positive Psychology: Positive psychology attempts to understand and promote the factors that allow humanity to flourish (Seligman & Csikszentmihalyi, 2000).
ACKNOWLEDGEMENTS

I would like to thank my Advisor, Dr. Jolie Mayer-Smith, and my committee members, Dr. Cynthia Nicol and Dr. Gaalen Erickson for their support, encouragement, and constructive suggestions. I extend a special thank you to Dr. George “Pinky” Nelson who has supported me as a friend and mentor through my entire graduate program. My gratitude goes to the children and teachers who welcomed me into their Mountain Explorations journey, and to my colleagues and good friends, Dr. Carl Leopold, Dr. Estella Leopold, Dr. Steve Kress, Dr. Eugene Meyers, Dr. Lesley Wright, Konrad Liegel, Jeff Giesen and Peter Capen who shared their expertise.

Finally, I would like to thank my wife Mary for her support, encouragement, and understanding, daughters Emma Rose and Margaret Anne for their patience and faith, and my parents James and Dorothy Burgess without whom this thesis would not be possible.

Dad, you’ve always been my inspiration.
DEDICATION

I dedicate this research to pioneering ecologist, Aldo Leopold whose poetic book, *A Sand County Almanac*, inspired my own path as a naturalist and lead to a lifetime of Natural History study and teaching. I have often pondered Aldo’s keen insights about the natural world. Based on a lifetime of field experiences, Leopold said, “A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise” (1949, p. 216). To understand a statement like this requires time steeped in natural history study. The passionate heart of my own interest in nature grew from a childhood fascination for birds. Yet increasingly, children are living in a world where nature is inaccessible. Children are losing their sensitivity and connection to the natural world; its gentle slowness and ordinariness are being replaced by electronic stimulation and virtual experience. As a consequence fewer of our children hear, see and build relationships with the birds, plants and animals that share their environment. This research offers hope, though nature is perhaps less accessible, it still flourishes in the heart and imaginations of our many children.
CHAPTER ONE
INTRODUCTION TO THE STUDY

Prologue

From the lakeside gravel road we join a trail that immediately enters a mixed deciduous and evergreen forest. Flickering green shadows create an inspirational entry into the living forest. Linger at this natural threshold, surrounded by vibrant nature, fifth graders Emily and Anna exclaim, “Look at this flower, it’s tiny! Hey, did you see this orange mushroom? Something has been gnawing on it. It is cold when you touch it.” They kneel. “Wow, feel this leaf, it’s like velvet! Oh, did you hear that tapping sound?” The girls are lost in intimate interaction with their natural surroundings. Each step down the trail brings a new discovery accompanied by rich emotional responses. The girls share a vital responsiveness to their environment that suggests an intrinsic and heartfelt sense of awe for nature. As Emily and Anna venerate their natural surroundings, I pause to wonder, Is this what emergent Biophilia looks and feels like? (researcher field notes, May 5, 2008)

Introduction

Emily and Anna’s initial experience at Mountain Explorations, a residential environmental education program in the North Cascades Mountains, provides a vivid introduction to this study of children’s perceptions of nature. When I joined six children on their first hike at Mountain Explorations, I was unprepared for the immediacy with which students would express a plainly uninhibited embrace of the Cascadia wilderness. For lack of a better title, I named their emotional response the “Emily and Anna Effect”
and decided that this phenomenon deserves further exploration in terms of social context, emotional and cognitive dispositions.

During an extensive pilot study with five public school classes attending Mountain Explorations, I began to focus on children’s perceptions of nature both in the school setting and within the larger wilderness setting of Mountain Explorations. My observations suggested that during unguided discovery, students were actively and deeply engaging with the natural world. I noticed that their “meaning making” along the trail had both affective and cognitive dimensions. Quite clearly, during episodes of nature discovery, a deeply moving affective experience was taking place alongside their active accumulation of new knowledge.

These initial observations of students experiencing nature led to my current research project that attempts to elucidate how nature discovery and the consequent affiliation with nature looks and feels when children are experiencing wilderness. Specifically, students’ emergent trailside expressions of biophilia led me to formalize this study and conduct a more focused study of children as they experience an environmental education program.

The Problem

With the growing anthropogenic pressures on the earth’s biotic communities and our increasing concern over children’s diminishing affiliation with nature (Louv, 2005), it is now essential to embrace a comprehensive educational transformation that is attentive to an ecological and practical wisdom of place. By considering humans and nonhumans as a coupled system (Orr, 2002; Speth, 2008; Wilson, 1996), people can be seen to
interact reciprocally with natural components (Tsurusaki, Wilson, Wilke, Zesaguli, & Anderson, 2007). My research will build on the 25 years of multidisciplinary research on love of living things, or what has been termed biophilia (Kellert & Wilson, 1993; Wilson, 1984) as I investigate how our innate tendency to focus on life and life-like processes can be used to understand children’s affiliation with nature.

The Study

The intent of this research is to investigate grade five children’s experiences in nature as they experience an instructional sequence in Mountain Explorations, a residential outdoor environmental education program.

Two questions guide my doctoral study:

1. **What are children’s perceptions and experiences in nature?**

2. **What types of experiences with nature support the development of biophilia in children?**

To answer these questions, my study utilized qualitative methods to understand children’s learning in these environmental learning environments including children’s perceptions of the environment and their relationship to nature. I have, therefore, designed my dissertation research to document biophilia in action. Using qualitative interviews, naturalistic observation and artifact collection, I studied children’s responses to nature during an environmental education program known as Mountain Explorations. This nationally recognized youth program was translated from a camping-based program into a facility-based program when the new Cascadia Environmental Learning Center

1 To ensure anonymity and to maintain privacy and confidentiality, I used pseudonyms for the program, learning center, teachers and children.
became operational in 2003. Today, the Mountain Explorations program represents a unique opportunity to study a school-based residential environmental education program situated deep in a wilderness setting.

Mountain Explorations’ location and program provide an ideal space to study how biophilia is aroused in participants. The focus on science and the natural and cultural history provides the students attending Mountain Explorations program with strong academic foundation to understand the natural systems in the heart of the North Cascade Mountains. The overarching programmatic goal for Mountain Explorations: *To connect students to the natural world through a positive and safe residential field-based educational experience* is implicitly linked to promoting biophilia. Hands-on educational activities along the trail introduce students to mountain ecosystems and provide intimate contact with the diverse ecological communities in the North Cascade Mountains. This study of children who participate in Mountain Explorations contributes to our understanding of biophilia and what types of experiences with nature may arouse and support the development of biophilia.

**Significance of the Study**

In this study, I explore how biophilia can help researchers and educators focus on the vital intersection between individual and environment. Since biophilia demands a consideration of what it means to include the larger biotic community in our discussion of educational reform, this research will contribute to our evolving understanding of the relationship between people and the natural world. Research and writing are needed to help define what biophilia looks like for children and non-naturalists. Discovering which
aspects of nature experiences are particularly provocative for children is the first step toward understanding how these experiences arouse biophilia.

An understanding of biophilia is foundational to investigating how children incorporate their experiences in terms of their conservation outlook. Environmental educators continually ask, “Are our educational strategies making a positive difference in children’s attitudes and behaviors toward the environment?” This question is more peripheral since assessing conservation outlook is not central to this study that focuses on children’s response to nature. However, since the survival of humans depends on preserving natural systems that make up the diverse biotic community, the pioneering ecologist Aldo Leopold argues that we extend ethical concern to the “land” or entire biotic community. Leopold wove linkages between nature, education and conservation.

As Leopold (1949) so poetically portrayed in his ecological non-fiction book, *A Sand County Almanac*, the land ethic “simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land” (p. 239). His *land ethic* recognizes that it is “absurd and suicidal to base a culture on the anthropocentric view of the world” (Bowers, 1993, p. 139). I speculate that a curriculum framework consistent with Leopold’s land ethic and informed by Wilson’s biophilic ecological perspective could help reestablish ecological sustainability or what Barry Lopez (2001) describes as “good relations with all the biological components humanity has excluded from its moral universe” (p.2). My interest is how biophilia might look in action from the individual child’s perspective. That is, how do children represent their passage from an egocentric to a more anthropocentric and eventually a biocentric perspective?
Scholars in both the biological sciences and education conjecture that once we love and understand natural systems, we may more easily extend environmental ethics to the diverse individual species that comprise the complex land organism (Gould, 1991; Leopold, 1949; Orr, 2004; Pyle, 2002; Wilson, 2006). Many environmental educators share this conservation assumption. Thus, the biophilia hypothesis provides a salient conceptual framework to explore education reform that starts by listening to children’s ideas about nature.

By providing empirical data, my research addresses an important gap in environmental education literature, specifically the need for research that examines the impact of environmental education on students’ capacity for biophilia. Data on the efficacy of the Mountain Explorations program to build and nurture biophilia will help guide the adoption of new curriculum and programs in an international context. The focus on public school students will inform the larger reform efforts in science education. Finally, this research will help us understand biophilia and ways we might promote the extension of environmental ethics to the 10 million or more species that still inhabit the planet (Wilson, 1996).

**Organization of the Thesis**

This thesis is developed in seven chapters. In Chapter One, I introduce and situate the study for the reader in terms of its theoretical basis and my intentions, and present the organization of the thesis. In Chapter Two, I review the literature associated broadly within three domains. First, I explore the research on the changing human relationship with nature. Second, I discuss the origins and implications of biophilia as a
theoretical framework for analysis of children’s experiences in nature. Third, I review the relevant literature on environmental education.

I begin Chapter Three by providing a context of the study. I then describe my methodology and explain my qualitative methods. I describe my procedures for data collection and detail the frame of analysis used to examine how children’s experiences of nature during Mountain Explorations influence their underlying affective and cognitive perceptions and understandings associated with nature. I address the limitations of my study and end with a discussion of ethical considerations.

Chapter Four contains vignettes that are designed to help the reader experience Mountain Explorations program by illustrating children’s experiences in the wilderness. In Chapter Five, I present my findings of children’s environmental values. In Chapter Six, I present the cases of three grade 5 children whose stories illustrate different biophilic expressions. I analyze the children’s experiences in nature to illustrate how their participation in Mountain Explorations contributed to a change in their environmental values. In Chapter Seven, I summarize the research findings, discuss my conclusions, consider the implications of the study for environmental education, and offer suggestions for future research.
 CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

As a naturalist and educator, I have often observed children attending to the subtle nuances and interactions within biotic communities, embracing the natural world as one might a cherished friend. In my research, I investigated children’s experiences in nature and their biophilic tendencies during Mountain Explorations, a residential environmental education program in the wilderness of the North Cascades Mountains of Northwest Washington. Mountain Explorations focuses on natural and cultural history of the North Cascade Mountains. Children spend three days in the wilderness engaged in experiential, hands-on activities in science, math, art, social studies and conservation.

The goal of the Mountain Explorations program is to inspire a closer relationship with nature through direct experiences in the natural world. The Mountain Explorations philosophy and curriculum is informed by environmental literacy2 (Elder, 2003; Orr, 1992), natural history (Fleischner & Weisberg, 1992; Williams, 2005) and environmental education (Nabhan & Trimble, 1994; Pyle, 1993; David Sobel, 2004). The program emphasizes biodiversity and interconnections to inform people, emotionally and intellectually, about the role of the living environment in their lives.

This chapter will situate my study within the literature on the human relationship with nature, biophilia and environmental education. My research will build on the 25 years of multidisciplinary research on biophilia or the love of living things (Kellert & Wilson, 1993; Wilson, 1984) to build an understanding of children’s changing affiliation with nature during Mountain Explorations. Presented in two related and overlapping

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2 Literacy is the ability to read. Numeracy is the ability to count. Ecological literacy, according to Garrett Hardin, is the ability to ask "What then?" (Orr, 1996, p. 85)
analyses, I will first look at the human relationship with nature where I will discuss the origins and implications of the biophilia hypothesis as a theoretical framework for analysis of children’s experiences in nature. I will also discuss Kellert’s (1997) research on valuing nature and the implications of biophilia for environmental education. Second, I will critically assess curricular perspectives of biophilia.

**The Human Relationship with Nature**

The study of the human relationship with nature is “big in scope” and “interdisciplinary” involving such diverse fields as history, science, policy and human behavior (Kahn, 1999, p. 1). In what follows, I review and summarize a variety of literature on the human relationship with nature that discusses a positive affiliation with nature (biophilia). I begin by describing in detail Kellert and Wilson’s definition of biophilia that makes clear that the human tendency to affiliate with living nature may be genetically based but is highly dependent on culture for its development. Then, I briefly address the major critiques of biophilia. Next, I discuss empirical studies that support the biophilia hypothesis. I then describe Kellert’s (1997) values of nature and describe how these values are interrelated with human’s relationship with nature. I will end by discussing how biophilia can inform environmental education.

**The Biophilia Hypothesis**

"Biophilia" is the term coined by the eminent Harvard biologist Edward O. Wilson (1984) to describe what he believes is our innate affinity for the natural world. Strictly speaking, biophilia is the love of life or living nature (Soule, 1992). However, in
Kellert enlarges the reach of biophilia with several assertions:

The biophilia hypothesis proclaims the human dependence on nature that extends far beyond the simple issues of material and physical sustenance to encompass as well the human craving for aesthetic, intellectual, cognitive, and even spiritual meaning and satisfaction (p. 20).

Described as a fundamental, innate (or at least extremely ancient) human need and propensity to affiliate with life, biophilia is believed to increase the “possibility of achieving individual meaning and personal fulfillment” while furthering a “human ethic of care and conservation for nature, most especially the diversity of life” (Kellert & Wilson, 1993, p. 21).

The biophilia hypothesis has been explored from scientific, cultural and humanistic perspectives. Accounts of biophilia are also well chronicled as nature writing. This literature, generally defined as nonfiction prose writing about the natural environment, offers resplendent accounts of naturalists’ biophilic experiences. Many of these accounts are biographical and tend to be personal and reflective. These accounts do not provide educators with guidance on how to provoke others to achieve a biophilic disposition. As a start in that direction we need to define what biophilia looks like for young naturalists as well as non-naturalists. My study will help by portraying what biophilia ‘looks like’ in action for children.

**Empirical Studies that Support the Biophilia Hypothesis**

Based on a critical review of the research on learners and learning in environmental education, Rickenson (2004) found a small number of exploratory studies that focus on how learners perceive nature and how they in turn, utilize those lessons to
build a relationship with nature and the environment. Several studies report on students’ perception of nature, environment and the influences that may shape these perceptions of nature and relationships with nature (Bonnett, 1994; Bonnett & Williams, 1998; Kahn, 1999; Payne, 1998; Wals, 1994a).

Of particular interest to my research is Kahn’s (1999) comprehensive synthesis of a large number of empirical studies from diverse fields that look at the human relationship with nature and provide amplifying evidence for the biophilia hypothesis. These studies include research in five primary areas: (1) aesthetic and habitat selection; (2) physiological and psychological well-being; (3) affiliation with animals; (4) valuing nature; and (5) native biophilia. I describe each of these research areas and conclude with a description of Kahn’s structural-development research.

Kaplan and Kaplan (1989) studied aesthetic relationship with nature by looking at individuals’ preferences for different landscapes. They established that individuals favor particular landscape features: Nature is favored over a built environment (e.g., an environment with human buildings and roads); built environments with natural features are preferred to a built environment; scenes with mid-level complexity are selected rather than low-level complexity scenes; and heavily forested settings are found more attractive than open areas.

Building on this research, Orians and Heerwagon (1992) examined the role of evolutionary theory in landscape aesthetics and habitat selection. They hypothesized that certain landscapes, such as savannah-like environments, have promoted human survival and reproductive success. For instance, African savannahs that have scattered trees with a broad, umbrella-like canopy, should be preferred by humans because they provide people
with open vistas for detection of prey and predators as well as *climbable* trees for escape from predators. Their cross-cultural study was conducted with subjects from the United States, Australia and Argentina. Employing a photo questionnaire, subjects were asked to rate the attractiveness of different types of trees. Their research established the existence of a cross-cultural human bias for natural settings with prototypic trees of the savannah.

According to Urlich (1993), many studies have reported on changes in physiological and psychological well-being in response to nature and natural landscapes. These studies have involved a wide range of settings from gardens to hospitals and prisons. Urlich concludes that physiological well-being including stress reduction is one of the key perceived benefits when people spend time out-of-doors in nature, especially in the wilderness. While not commenting directly about biophilia, Urlich’s conclusions provide support for the idea that affiliation with nature may be central to human well-being in ways that need further investigation.

The Yale ecologist, Shepard (1993, 1996), extended this research on biophilia by examining human affiliation with animals. He examined the literature on long-term human affiliation with animals and argued that our anthropocentric attitude toward animals flavors our entire relationship with nature. “Animals and their representations,” he writes, “constitute essential elements in human mental life” (p. 298). Shepard argues that wild fauna (not domesticated animals), when directly experienced, shape who we are as a species. Thus, to protect what he calls the “human capacity for self knowledge,” Shepard declares the importance of an on-going human affiliation with wild animals (p. 298). By examining children’s affiliation with wild animals such as black bears in the North Cascades Mountains, my research can help us critically examine Vining’s (2003)
claim that, “We cannot assume caring for a species leads to caring for ecosystems” (p. 96).

Kahn (2002) used a structural-developmental (constructivist) approach to study the human relationship with nature. He has extensively studied this relationship through the lens of developmental psychology and biophilia. While acknowledging the importance of an evolutionary framework, Kahn seeks a conceptual integration of evolutionary theory with constructivist or non-mechanistic psychological theory. Kahn rejects traditional mechanistic learning theories (e.g., behaviorist models that use positive and negative reinforcement to drive a child along the teacher’s learning trajectory) in favor of transformational developmental perspectives.

Kahn’s (1999) research, which focused on children and adults’ understandings of the natural world, has helped inform our understanding of how children’s perceptions of nature are “mentally organized (structured) and transformed through development” (p. 213). In his studies that took place over eight years with children, young adults and parents in diverse geographical locations, Kahn used interviews to probe people’s moral and ecological reasoning. Kahn described how people value nature, and how they reason morally about environmental degradation. He found that children have a deep connection to the natural world that is often severed by modern society. My study begins where Kahn’s ends as I use a multimodal approach to investigate what biophilia looks like in action as children directly experience nature in the Cascadia wilderness. Investigating children’s nature experiences at the beginning of their fifth grade year will help us understand how biophilia develops in upper elementary children. My research will build on Kahn’s work by exploring children’s authentic nature experiences in the wilderness of
the North Cascade Mountains. By employing not only interviews, but also observations and document collection, I build an in-depth picture of urban children experiencing pristine wilderness.

Indigenous scholars (Barnhardt & Kawwagley, 2005; Cajete, 2000; Hansen & Van Fleet, 2003; Nelson, 1983; Snively, Corsiglia, & Center, 2001) expand our interpretation of biophilia by arguing that biophilia is perceived in many ways. For example, Nelson (1983, 1989) claims the human need to affiliate with life is complemented by plants, animals and the rest of life needing to reciprocally affiliate with humans.

Nelson’s understanding of biophilia is based largely on the Koyukon worldview and an appreciation of our hunter-gatherer origins. Nelson spent a year among the Koyukon people of western Alaska, studying their intimate relationship with animals and the land. Nelson found that the Koyukon are part of a living/learning community that includes the land as well as the plants and animals, suggesting a *symbiotic* relationship with life (Nelson, 1983). The views of Nelson and indigenous scholars Barnhardt and Kawwagley (2005) inform my thinking and provide another lens for my examination of biophilia by advancing the importance of the role of indigenous knowledge and learning to our understanding of biophilia.

This examination of a variety of empirical studies from diverse fields that look at the human relationship with nature, provides evidence for the biophilia hypothesis. Used as a conceptual framework, the biophilia hypothesis can help guide the study of the formation of basic meaning people attach, and benefits they derive from the natural world.
The biophilia hypothesis provided a starting point for my investigation of children’s experiences and perception of nature in the wilderness of the North Cascades.

**Valuing Nature**

Of interest to my study of children’s perceptions of nature in a wilderness setting is Kellert’s (2002) distillation of two decades of studies on biophilia. In several books written over 20 years, Kellert (1996, 1997; Kellert & Wilson, 1993) developed the notion of environmental values in relation to evolutionary biology and biophilia. In his writing and studies, Kellert worked to determine common human responses to perceptions of, and ideas about, plants and animals, and worked to explain these in terms of the conditions of human evolution. I consider this body of research in more detail in the next section on valuing nature.

Kellert established a typology of nine basic values that “reflect a range of physical, emotional, and intellectual expressions of the biophilic tendency to associate with nature” (p. 129). The nine values were derived and refined from socio-psychological surveys of how people value wildlife and nature. Kellert’s typology provides the first attempt to systematically assess (through measurement and classification) how people value nature. Kellert’s developed his typology through studies of urban children and adults. He investigated people’s attitudes and values concerning nature. Kellert’s typology provided a way to examine the physical, emotional, and intellectual expressions of biophilia, but it has not been applied to children experiencing nature in a pristine wilderness like Mountain Explorations.

Kellert identifies limitations of his survey-based typology of values and indicates that it provides only “crude approximations of the underlying values” that represent
biophilia (Kellert, 1996, p. 38). In a follow-up study Kellert (1997) uses short narrative vignettes to illustrate the various ways biophilia is expressed in individual lives. Kellert’s work illustrates the usefulness of the typology in generating broad insights into an individual’s biophilic expressions. However, as Kellert points out, his use of questionnaires limited his ability to measure and understand aesthetic and symbolic values. My research helps to fill a current gap in the literature by looking at the connections between children’s expressions of environmental aesthetic and symbolic values as children experience wilderness. My adaption of Kellert’s typology will provide a tool to investigate a range of cognitive, affective, and emotional values in biophilia for children experiencing nature in a pristine wilderness.

According to Kellert, people’s cognitive learning begins with acquiring descriptive factual and conceptual knowledge of living diversity and its importance to human well-being. This intellectual education often starts by children learning to identify and classify elements of the natural world. Then, as learning continues, people develop conceptual understanding of ecosystem structure, function and process. Kellert concludes that intellectual learning is “complete” when people exhibit responsible stewardship. Kellert’s argument that cognitive knowledge comes before we can develop stewardship and biophilia is based on broad questionnaire data. Kellert implies that children build emotional connections only after they have sufficient knowledge. My study challenges this assumption as I investigate children who are learning about the natural world while they make concurrent emotional connections with plants and animals.

In contrast to intellectual learning, affective learning develops as humans cultivate an emotional appreciation of the living world evoking a sense of wonder and appreciation
of its beauty. According to Kellert (1996), these sentiments can be “unlocked” through building attachments to the familiar and appealing in nature, evoking both empathy and loyalty. Gurevitz’ (2000) empirical work expands on the Kellert’s research by looking at children’s imagined worlds and affective approaches to environmental education. My study will document how children build attachments, empathy, caring and aesthetic appreciation of nature through discovery experiences that are unique to wilderness. By examining how children incorporate the scary, mysterious and sublime in nature I will help elucidate what it means to “unlock” and cultivate biophilia.

**Environmental Education Informed by Biophilia**

Kellert (2002), like Wilson (1984) and Orians and Heerwagon (1992), is prudent to suggest that the underlying environmental values are “rooted in human biology” but are “shaped by the mediating influence of learning, culture and experience” (p. 129). Thus he avoids the limitations of subscribing to a singularly deterministic view of biophilia and human ethical development. Instead, Kellert (2002) argues that biologically based values require both learning and experience before they become “meaningful dimensions” of human emotional and intellectual life (p 132).

Although Kellert places importance on learning and experiences in nature to the development of biophilia, he does not examine the changing role that nature study (or what is now termed environmental education) has played and currently plays in cultivating children’s biophilia. Since the inception of the nature study movement in the late nineteenth century (Disinger, 1983; McCrea, 2006), a love of living things has informed environmental education. As an outgrowth of agricultural education reform, the
nature study movement sought to inspire in students an understanding and appreciation of outdoor life and a love for nature (Comstock, 1931). The founder of the nature study movement, Liberty Hyde Bailey (1903), described nature study as “the movement originating in the common schools to open the pupil’s mind by direct observation to a knowledge and love of the common things in the child’s environment” (p.4). However, as the range and complexity of global environmental crises has broadened, the response has been to enlarge the scope of environmental education to cover more global environmental topics often at the expense of direct experiences in nature that support biophilia.

Today’s global climate change, the increase in acidity of the earth’s oceans and the movement of synthetic chemicals in all food chains are just a few examples of vast anthropogenic changes throughout earth’s ecosystems (Orr, 2002, 2004). These threats provide the backdrop in which children today are developing their early perceptions of nature. At the time when children most need contact with nature to foster a caring relationship for the living world, they are increasingly finding nature inaccessible.

Though children have experienced nature through play for most of human history (Pyle, 2002), today, many children’s play environments are becoming increasingly urbanized (White, 2009). As children are losing the opportunity for direct and spontaneous contact with wild nature (Chawla, 1999; Kellert, 2002; Kuo, 2003; Malone & Tranter, 2003; Pyle, 2002; Rivkin, 1995; White, 2009), they increasingly experience urban nature that has undergone extreme anthropogenic alterations (Louv, 2005; Taylor & Kuo, 2006).

Francis (1991) refers to this urbanization of play environments and children’s sudden loss of free play in nature as a childhood of imprisonment. Pyle (1993) calls this
estrangement from the natural world the extinction of experience. He claims it breeds apathy towards environmental concerns. Though there are still intact wild areas that approximate unspoiled landscapes, wild nature such as wilderness remains difficult and costly for children to access.

Based on studies with children in four cultures, Kahn (2002) warns against a psychological phenomenon that he terms, “environmental generational amnesia” (p. 106). Due to constant degradation of the environment, each new generation of children take an increasingly degraded environment as normal. The result is a lowering of everyone’s expectations for ecosystem health and beauty. To curb environmental generational amnesia, Kahn advocates for early as well as life-long educational experiences in wild nature that can help cultivate biophilia. To address the issues raised by Kahn we need to understand more about biophilic response and the types of experiences that contribute to this.

**Curriculum Perspectives**

Increasingly, children live in a world where nature is inaccessible (Kellert, 2002; Louv, 2005) and our educational system often denies children the opportunity to play and explore in the natural world (Elder, 2003; Orr, 2002; Pyle, 2002). Though many scholars are beginning to embrace a curriculum perspective informed by environmental literacy (i.e., interconnectedness of nature, economy and equity), the role of biophilia in achieving ecological literacy remains vague among education leaders.

For example, Douglas Sloan (1993) promotes a “holistic” curricular vision that challenges the troubling extension of science and technology into every aspect of modern life (e.g. iPods and cell phones) and links environmental degradation to growing racism.

Almost uniformly, these scholarly analyses tend to emphasize human ecology and human nature over what I will term, natural history or the natural world. According to Tewksbury (2009), natural history is the observational, descriptive, and comparative study of the natural world. Equally important, Tewksbury suggests that natural history provides a path to nurture a fundamental human emotional connection to the non-human world. In Kellert’s terms natural history is represented by scientific-ecologic and humanistic values. Since natural history forms the foundation of ecology and evolutionary theory, it is key to conservation of wildlife and nature (Herman, 2002). But more important to this study, Wilson (1994) suggests that natural history helps children build a sense of place in the natural world. As children’s understanding and ability to value natural systems are nurtured, Wilson suggests that their sense of biophilia can flourish. Yet in the last 75 years, we have seen a steady loss in the practice of natural history in research and education (Tewksbury, 2009).
It is clear that humans continue to marginalize the nonhuman communities that represent the vast majority of life forms on the planet (Orr, 2002). This anthropocentric trend is reflected in most curriculum theorizing, which has yet to embrace biophilia. A few theorists are beginning to adopt a more biocentric perspective. For example, Bonnes and Bonaiuto (2002) call for a context that addresses the “full ecological environment,” blending human and non-human species in a biocentric outlook. Some scientists warn, that without a strongly nurtured relationships between humans and nature, children may soon forget that they are part of the complex web of life on the planet (Capra, 1997, 2002; Wilson, 2005).

**Summary**

Our ideas about nature are changing as human impact on the planet increases. In response, environmental education also must evolve. This review presented in two parts investigated human relationship with nature related to biophilia and environmental education and curricula. The empirical studies from diverse fields presented here, which look at human relationship with nature, provide support for the biophilia hypothesis. Further, they indicate how an environmental value approach may provide a means to explore biophilia in practice. What we don’t know yet is how important a nature experience in a wilderness is to the cultivation of early childhood biophilia. To address this issue of wilderness-based biophilia, I investigate children’s experiences and perceptions of nature in the pristine setting of the North Cascade Mountains. I also examine what influences the development of children’s biophilia in wilderness settings. In doing so, this case study of children’s experiences and perceptions of nature in the
Mountain Explorations program will contribute to our understanding of how children can build a relationship with and come to value, love and appreciate the natural world.
CHAPTER THREE

METHODOLOGY

This is a study of children’s experiences and perceptions of nature and biophilia during a residential outdoor environmental education program in the North Cascades Mountains. Because students are immersed in the diverse and abundant life of the North Cascades Mountains, the wilderness setting is an excellent site to study students’ emergent expressions of biophilia.

My specific research questions were:

1. What are children’s perceptions and experiences in nature?
2. What types of experiences with nature support the development of biophilia in children?

In this chapter, I describe the context of the study including a brief ecological description of the North Cascades Mountains, followed by a description of the Mountain Explorations program and the study participants. I then discuss the research methodology and specific methods used to collect, analyze and represent my data. Next, I discuss the limitations of this study including my assumptions, biases and roles as a researcher. Finally, I address trustworthiness and ethical considerations.

Context of the Study

This research took place in the wilderness setting of an environmental learning center and one public school in an urban community in Washington. The focus of the
study was an environmental education program called Mountain Explorations. The program consists of a 3-day wilderness field experience at the Cascadia Learning Center, in the North Cascades Mountains of Washington. For the purposes of the research, I define Mountain Explorations as the initial introductory visit to the elementary classroom by Mountain Explorations staff and the 3-day outdoor experience at the Cascadia Learning Center. The program aims to connect elementary students to nature and community through multidisciplinary and hands-on study of natural and cultural history of the North Cascades Mountains (USA, 2009).

The North Cascade Mountains are ecologically unique in several ways. They are one of the most diverse ecosystems on the planet. The number of animal species that make their home in the North Cascades is just one measure of diversity. The park habitats encompass alpine meadows at glacial margins to low elevation forests and wetlands. The North Cascades are also one of the snowiest places on earth leading to abundant glaciers, wetland resources and magnificent waterfalls (USA, 2009).

The diversity of habitats and the remoteness of these craggy mountains supports cougar and bear as well as rare mammals like lynx, gray wolf, fisher and wolverine. Scientists continue to document the 500 types of land insects and approximately 250 aquatic invertebrate species found in the park (USA, 2009). This rich diversity makes the North Cascades an excellent location for students to study the interconnections between biotic and abiotic elements of the mountain environment.

As E.O. Wilson (1993) suggests, the natural world provides children with an “information rich environment” (p. 123). According to Kellert (2002), the natural world

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3 To ensure anonymity and to maintain privacy and confidentiality, I used pseudonyms for the program, learning center, teachers and children.
can provide “young people with an unrivaled source of attraction, stimulation and challenge relevant in both intellectual and emotional development” (p. 123). Because children are immersed in diverse and abundant life during Mountain Explorations, the Learning Center is an ideal site to study students’ emergent expressions of biophilia.

The forested Cascadia Learning Center is located on the shores of Diablo Lake in North Cascades National Park. The Cascadia Learning Center features 16 buildings that model earth-friendly design and operations. Surrounded by 7,000,000 acres of protected public lands in Washington and British Columbia, this wilderness setting is the home of the Mountain Explorations program, one of the many education programs at the Cascadia Learning Center. Bound ecologically to Cascadia, a bioregion that includes all of the watersheds that flow into the Pacific Ocean through North America’s temperate rainforest zone, the Mountain Explorations program provides a unique system for the study of children’s experiences and perceptions of nature.

Mountain Explorations is a 3-day residential wilderness experience. Students travel by bus to the Cascadia Learning Center with their classmates, teacher and chaperones to learn about the ecosystems, geology and natural and cultural history of the mountains. Days are spent on trails that surround the Learning Center and in the Center’s Aquatic and Terrestrial Labs. Topics of study include carnivores of the North Cascades, biodiversity, aquatic ecology, glaciers and geology, cultural history, ethnobotany and forest ecology. The complete Mountain Explorations curriculum is summarized in Figure 3.1.
MOUNTAIN EXPLORATIONS

PROGRAM GOALS
In the Mountain Explorations program, students engage in hands-on exploration of the North Cascades ecosystem to learn that everything is connected in an ecosystem. Students are encouraged to think about ways to incorporate the lessons learned at Mountain Explorations into their lives back home.

DAY 1 THEME: ABIOTIC
Topics:
- Introduction to the Web of Life and The Mind Map
- Trail Tips
- Web of Life (Integrated into all days of Mountain Explorations)
- Water and Glaciers in the North Cascades
- North Cascades Geology
- Weather

DAY 2 THEME: BIOTIC
Topics:
- Forest Food Chain
- Each One Teach One
- Investigating Predators in the North Cascades Ecosystem
- Bone Lab
- Microscope Lab
- Web of Life
- All Day Hike to Waterfall
- How Does Your Garbage Grow? Where Does your Garbage Go?

DAY 3 THEME: COMMUNITY and REFLECTION
Topics:
- Silent Hike
- Bringing it Back Home Map Exercise
- Postcards
- Nature Writing and Animal Poetry
- Closing Circle and Unselfish Wish
Though aligned with the Washington State Essential Academic Learning Requirements (OSPI, 2005), Mountain Explorations is not a required school district educational program. Classes attend voluntarily on a space-available basis. Each year, around 1800 students, 250 parent/guardian chaperones and 80 teachers from 15 schools across Puget Sound participate in this program. The individual classroom teachers lead the Pre- and Post-Program instructional activities at their school. The majority of the Mountain Explorations instructional activities occur at the Learning Center under the guidance of trail leaders.

The primary instructors and trail leaders at Mountain Explorations are graduate students in a professional residency environmental education program at a Washington State university. During every Mountain Explorations program, a graduate student is responsible for leading one trail group comprised of six to eight elementary students and two parent/guardian chaperones. In addition to the graduate students and faculty, park rangers and park resource managers help teach Mountain Explorations students.

**The Study Participants**

The participants for this study were two classes of grade 5 students (ages 10-11) from an urban school district in Washington State who attended Flynn Park Elementary during the 2008-2009 school year. Flynn Park Elementary enrolls approximately 450 students in grades K-5 from a multicultural neighborhood that includes upper-middle, middle and lower income families, and Hispanic and First Nation learners.

I chose to work with Flynn Park because the grade 5 classes reflected the demographics of the larger community and were composed of children with a wide range
of socio-economic and cultural backgrounds that included English Language Learners (ELL) and Special Education students (SPED). One class of 11 students attended Mountain Explorations from September 15 to 17, 2008 and the other class of 24 students attended Mountain Explorations from September 17 to 19, 2008. Information about the participating students is presented in Table 3.1.

Table 3.1 Participating Classes and Students

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Girls/Boys</th>
<th>ELL</th>
<th>SPED</th>
<th>Neighborhood Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ms. Morino</td>
<td>14/11</td>
<td>3</td>
<td>4</td>
<td>Upper Middle/Lower/Hispanic/African American</td>
</tr>
<tr>
<td>Ms. Ashby</td>
<td>4/7</td>
<td>1</td>
<td>5</td>
<td>Upper Middle/Lower/Native American</td>
</tr>
</tbody>
</table>

*Note. ELL refers to English Language Learner and SPED refers to Special Education*

**Methodology**

In the introduction to his book, *Children and Nature*, Kahn (2002) points to Leopold’s poignant expression of impatience with conservation education and that the “usual answer to this dilemma is ‘more conservation education’” (p. 2). I am interested in the quality of conservation education (what we now call, environmental education) and how children develop biophilia or what Leopold (1948, 1987) refers to as, “love, respect and admiration” for nature (p. 209). Can environmental education encourage a biophilic response to nature in children? Is encouraging this response likely to come about by simply providing more environmental education or do we need a different approach (Hart, Jickling, & Kool, 1999)?
These are critical issues today since children are increasingly living in a world where nature is inaccessible (Kellert, 2002; Pyle, 2002). If children are losing their sensitivity and connection to the natural world, what role, if any, can environmental education play in helping children hear, see and build positive relationships with the birds, plants and animals that share their environment? Can we provide children with experiences in nature that arouse biophilia? To examine these issues, I required a methodology that would allow me to look in-depth at the meaning that children construct from their experiences in nature during an environmental education program.

I adopted a naturalistic case study strategy. Yin (2008) describes case studies as inquiry that addresses “a how or why question” about “a contemporary set of events” in a real-world setting, “over which the researcher has little or no control” (p. 13). My study meets these criteria. I asked how children perceive and experience nature during a residential environmental education program and how children’s experiences in nature arouse biophilia. The contemporary events being investigated were children’s experiences of nature during a residential environmental outdoor education program within the real-world setting of the North Cascade Mountains. As a participant/researcher in the Mountain Explorations program, I supported the children in their field explorations but had little or no control over the program or students.

Creswell (2003) describes a case study as an in-depth exploration of a bounded system such as “a program, an event, an activity or process, or one or more individuals” (p. 15). A case study is suitable when the study demands a rich description of the phenomena under investigation. Merriam (1998b) and Hancock and Algozzine (2006), also emphasize the need for intensive description and analysis of a bounded system that is
isolated in space and time. My case study involved two grade 5 classrooms in the limited
time frame of the Mountain Explorations program and my research into children’s
experiences in nature during this residential environmental education program resulted in
rich descriptions that help provide a picture of emergent biophilia.

According to Merriam (1998b), case studies are particularistic, descriptive and
heuristic. A case study is particularistic because it focuses on a specific event, program,
institution or phenomenon. It is descriptive because the result is a thick and rich
description of the event, program or phenomenon being studied and it is heuristic when it
uncovers understanding or illuminates new meaning for the reader. My study
demonstrates these characteristics because it focuses on the experiences of two classes of
grade 5 students during a residential environmental education program and results in a
holistic description that explains and illuminates children’s experiences and perceptions
of nature during Mountain Explorations.

Methods

Data Collection Procedures

I researched children’s experiences and perceptions of nature and biophilia during
a 3-day wilderness field experience of the Mountain Explorations program at the
Cascadia Learning Center, in the North Cascades Mountains of Washington. The three
primary data sources, interviews, observations and documents, provided the empirical
basis for my study. Prior to Mountain Explorations I visited each class at the school to
explain the study to the children and to answer any questions they had about the project.
A week later, I returned to the school to individually interview the children about their
perceptions of nature. These pre-program interviews provided information about children’s initial views and beliefs.

Then, to help me address my research questions concerning children’s experiences with nature, I observed and documented children’s involvement in activities, their conversations and behaviors during the 3-day residential Mountain Explorations program. I supplemented this observational data set by collecting samples of student work during environmental education activity sessions and by taking digital photographs as students participated in Mountain Explorations events.

Approximately one month after the 3-day residential experience was over I returned to Flynn Park Elementary to interview the children again about their perceptions of nature. I augmented this interview data by collecting copies of the students’ Mountain Explorations journals and their letters, written as a classroom assignment, to the Parent Teacher Association (PTA). These research activities and a timeline of the events are presented in Table 3.2. In the next four sections I discuss each of the data sources.
Table 3.2 Timeline of the Research

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Event 1 Contact Teacher</th>
<th>Event 2 Classroom Visit</th>
<th>Event 3 Pre-Program Interview</th>
<th>Event 4 Mountain Explorations</th>
<th>Event 5 Post-Program Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ms Ashby’s Class</td>
<td>August 28, 2008</td>
<td>September 5, 2008</td>
<td>September 8-12, 2008</td>
<td>September 15-17, 2008</td>
<td>October 22-24, 2008</td>
</tr>
</tbody>
</table>

*Pilot Study*

During the spring of 2008 I piloted my study of children’s perceptions of nature with five schools at the Cascadia Learning Center. I had several goals for the pilot study. First, I wanted to become familiar with the physical layout of the buildings and extensive trails system at the Learning Center. By understanding the layout and functional attributes of the buildings and outdoor learning shelters, I could be more efficient during data collection activities for this study.

Second, I sought to become familiar with the goals, learning activities and logistics of the Mountain Explorations program. To witness the diversity of Mountain Exploration program elements, I knew that I needed to move between trail groups, rather than staying with one trail group the entire time. Since trail groups inevitably spread.
across the wilderness landscape my having familiarity with the program structure and logistics, allowed me to more easily navigate between independent trail groups.

Third, I wanted to field test my data collection procedures. The pilot study allowed me to explore, refine and focus my field observation techniques on purposely selected activities and sites (Creswell, 2003). Information about the schools and students that took part in the pilot study is presented in Table 3.3.

Table 3.3 Participating Schools and Students for Pilot Studies

<table>
<thead>
<tr>
<th>Schools</th>
<th>Grade</th>
<th>Girls/Boys</th>
<th>ELL</th>
<th>SPED</th>
<th>Neighborhood Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayview</td>
<td>5</td>
<td>10/11</td>
<td>5</td>
<td>2</td>
<td>Upper Middle/Middle/Lower</td>
</tr>
<tr>
<td>Bayview</td>
<td>5</td>
<td>9/12</td>
<td>4</td>
<td>3</td>
<td>Upper Middle/Middle/Lower</td>
</tr>
<tr>
<td>Lakewood</td>
<td>5</td>
<td>13/10</td>
<td>3</td>
<td>6</td>
<td>Upper Middle/Middle/Lower/Hispanic</td>
</tr>
<tr>
<td>Cedarwood</td>
<td>5</td>
<td>14/11</td>
<td>4</td>
<td>1</td>
<td>Middle/Lower/Hispanic</td>
</tr>
<tr>
<td>Cedarwood</td>
<td>5</td>
<td>4/5</td>
<td>2</td>
<td>6</td>
<td>Middle/Lower/Special Needs/Hispanic</td>
</tr>
</tbody>
</table>

*Note.* ELL refers to English Language Learner and SPED refers to Special Education

**Interviews**

To elicit children’s perceptions of nature during the Mountain Explorations program, I conducted both semi-structured interviews and informal interviews with the children. In field studies with children, Drew, et al. (2008) and Fontana and Fey (2000) suggest that face-to-face, semi-structured interviews be complemented by informal interviews in the field. Merriam (1998b) views interviews as “conversations with a purpose” that allow qualitative researchers to understand how people interpret the world around them (p. 71). By definition, the semi-structured interview is guided by the researcher, conducted away from the research scene and is audio-taped for later
transcription (Drew, et al., 2008; Hatch, 2002). In contrast, the informal interview is unstructured, conversational, and occurs in the research scene (Hancock & Algozzine, 2006; Hatch, 2002).

The Pre- and Post-Program semi-interviews were conducted with the 35 students in the two classes. I chose to interview the children one-on-one, face-to-face (Creswell, 2003), using open-ended questions because these “special conversations” would allow me to explore children’s “experiences and interpretations” of nature (Hatch, 2002, p. 92). All interviews lasted 20 to 30 minutes and were audio taped for transcription. By tape recording student responses, I could stay fully engaged in the nuance of children’s words and facial expressions (Wals, 1994b). The interviews took place at the students’ schools at the convenience of the teacher and students, during recess or lunch breaks in a classroom.

As recommended by Hatch (2002), Miles and Huberman (1994) and Merriam (1998b), I generated open-ended interview questions that included follow-up responses to probe for additional information. I used three types of questions: descriptive, structural and contrast (Hatch, 2002). For example, during Pre-Program interviews I asked children to describe nature, “When you look in a forest what do you see?” or “What are some words that you would use to describe nature?” A follow-up structural question helped probe deeper, “What characteristics do natural places have in common?” To investigate further, I asked a contrast question, “If you were to leave the city and go out into the countryside how do things change?”

To better understand children’s thinking about nature in contrast to human environments, I asked, “How is a zoo the same or different from nature?” If students
seemed uninspired, I attempted to engage them with an interesting scenario. For example, I asked a descriptive question, “Imagine someone you met had never seen outside this room, how would you describe the natural world to them?”

While constructing interview questions, I carefully avoided double-barreled questions, ambiguous language, jargon and technical language (Creswell, 1998, 2003). My neutral questions used familiar accessible language to probe respectfully, children’s perceptions of nature (Hatch, 2002). I created interview protocols that provided structure and flexibility for the two interviews (Drew, et al., 2008). The Pre- and Post-Program interview protocols are presented in Appendix A.

To augment the Post-Program interview protocol, I prepared briefing notes about each child, based on Pre-Program interviews and field notes. Since effective qualitative interviews are respectful, encouraging and often begin with small talk (Bogdan & Biklen, 2003; Hatch, 2002), I would read my notes to help familiarize myself with the child’s Pre-Program responses before each interview. The notes allowed me to make meaningful connections with the children and create coherency between Pre-Program interviews and Post-Program interviews. I concluded each Post-Program interview by reading children’s initial perceptions of nature back to them, and then asking what they would add to their description.

To trigger memories of Mountain Explorations during Post-Program interviews, I employed photos to stimulate children’s recall. Photo elicitation interviews have been used effectively in a wide variety of settings in health care and education (Carlsson, 1999; Epstein, Stevens, McKeever, & Baruchel, 2006; Hurworth, Clark, Martin, & Thomsen, 2005; Loeffler, 2004; Prosser & Schwartz, 1998). Photo elicitation in its
various forms can trigger memory, challenge participants, lead to new perspectives, and assist with building trust and rapport (Epstein, et al., 2006; Hurworth, et al., 2005). By providing children a series of six photographs depicting Mountain Explorations experiences (i.e., hiking, an outdoor learning shelter, trail activities, Microscope Lab, and the Bone Lab), I stimulated recall of learning activities and experiences during Post-Program interviews.

My informal interviews with the children were unstructured conversations that took place in the research scene during Mountain Explorations. These informal interviews probed children’s perceptions of their learning activities in the wilderness. Informal interviews served as a type of member check that allowed me to challenge my interpretations of my observations and field notes and assess the intent of children’s actions (Lincoln & Guba, 1985). While I accompanied trail groups during their learning activities, there were harsh field conditions such as wind and rain that prevented me from making audio recordings of conversations in the field. I therefore relied on field notes to document these informal conversations.

Observations

The students in trail groups were also the focus of naturalistic observations. I recorded observational notes in a field research journal as classes participated in Mountain Exploration’s environmental education activities. I documented my impressions of the children’s experiences in nature and reflected on students’ social and environmental interactions. These impressions included the verbal and nonverbal cues
displayed by the students. I also reflected on and wrote down in my research journal my impressions and experiences during Mountain Explorations.

**Documents**

In addition to the interviews and observations, I collected, photocopied and analyzed samples of student work produced during Mountain Explorations activities. These documents included the Mountain Exploration children’s journals that contained their field notes, checklists, worksheets and creative writing. I also collected the artistic postcards children wrote as a reflective exercise the last day at Mountain Explorations, and the Thank-you Letters they wrote to the Parent Teacher Association (PTA). The PTA letter was written as class assignment the week after Mountain Explorations had ended. Children were prompted to share their specific memories of learning experiences at Mountain Explorations using descriptive language that allowed their reader to “jump into the experience through words.”

These documents provided an “unobtrusive source” of “language and words” of students that could be accessed at my convenience (Creswell, 2003, p. 187).

**Photography**

I used digital photography to document students’ experiences during their 3-day environmental education program. To supplement my photographs of Mountain Explorations, I provided each trail group with a 27-shot, one-time-use camera. While many students brought cameras from home, the research cameras were usually carried
and used by students who did not have access to a personal camera of their own. I instructed these students to “photograph nature along the trail.”

These photographs were used during Post-Program interviews to stimulate students’ memories of nature at Mountain Explorations as we discussed their interactions with the natural environment. I showed each child the same selection of photos taken with the research cameras by peers (e.g. children on a trail, looking through microscopes, playing games, investigating animal tracks and participating in a bone lab). Some digital images were used for reporting the findings of this study. Student and parent/guardian consent was obtained for the use of these images.

**Data Analysis**

To answer my research questions on children’s perceptions and experiences of nature and experiences that influenced the development and expressions of biophilia in children I analyzed the Pre- and Post-Program interviews and documents of all 35 students who attended the Mountain Explorations program. I supplemented this analysis with my research field notes and observations that provided a record of children’s conversations, interactions and engagement during trail learning activities. To focus more closely on the significance of particular experiences in nature for children’s expressions of biophilia, I performed an in-depth analysis of the experiences in nature of three children. Again, I supplemented this analysis with my research field notes and observations that documented children’s behaviors and engagement during Mountain Explorations learning activities. I chose an urban dwelling Native American girl, a country dwelling Hispanic girl, and an urban dwelling African American boy. These
three Flynn Park students were chosen because they reflected the wide range of socio-economic and cultural backgrounds evident in the demographics of the larger community.

To begin my data analysis, I transcribed the Pre- and Post-Program audiotapes verbatim. I then analyzed the transcripts and compared and coded them for themes through repeated reading and constant comparison (Cresswell, 1998; Creswell, 2003; Creswell & Clark, 2007; Strauss, 1987) with the goal of developing a coherent picture of children’s initial perceptions of nature.

As I developed my coding scheme I drew from the previous work of Kahn (1999), Wals’ (1994a) and Kellert (1996). According to Kahn (1999), “general coding categories are driven not only by your data but by your theoretical commitments and research questions” (p. 89). I chose Kellert’s (1996) typology of environmental values for my primary frame of analysis. Kellert identified nine values (scientific-ecological, naturalistic, symbolic, aesthetic, humanistic, negativistic, moralistic, utilitarian, and dominionistic) (Table 3.4) during his extensive studies of a wide range of differences in values toward nature by age, culture, education, income ethnicity, gender and place of residence (Kahn, 1999). In Kellert’s (1996) words, these values of nature “reflect a range of physiological, emotional and intellectual expressions of the biophilic tendency to associate with nature” (p. 26). Drawing on the affective maturation taxonomy devised by Krathwohl, Bloom and Masia (1964), Kellert (2002) characterized affective development as focusing on children’s feelings and emotions, while values combine affective and cognitive perceptions and understandings. For Kellert (2002), values represent a convergence of emotion and intellect resulting in a distinctly human experience.
<table>
<thead>
<tr>
<th>Value</th>
<th>Functional Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific-Ecological</td>
<td>Systematic study of the structure, function and relationship to nature leading to understanding, knowledge and observational skills.</td>
</tr>
<tr>
<td>Naturalistic</td>
<td>Direct experience and exploration of nature to satisfy curiosity and provide discovery and recreation.</td>
</tr>
<tr>
<td>Symbolic</td>
<td>Use of nature for language and thought resulting in communication and mental development.</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>Physical appeal and beauty of nature leading to a sense of inspiration, harmony and security.</td>
</tr>
<tr>
<td>Humanistic</td>
<td>Emotional attachment and love for nature leading to bonding, sharing, cooperation and companionship.</td>
</tr>
<tr>
<td>Negativistic</td>
<td>Fear, aversion and alienation from nature reflecting on a sense of security, protection, safety and awe.</td>
</tr>
<tr>
<td>Moralistic</td>
<td>Spiritual reverence and ethical concern for nature suggesting order, meaning, kinship and altruism.</td>
</tr>
<tr>
<td>Utilitarian</td>
<td>Practical and material exploitation of nature to provide physical sustenance and security.</td>
</tr>
<tr>
<td>Dominionistic</td>
<td>Mastery, physical control and dominance of nature building mechanical skills, physical prowess and an ability to suppress.</td>
</tr>
</tbody>
</table>
Kellert’s values of nature provided me with a frame of analysis to examine how children’s experiences of nature during Mountain Explorations influenced their underlying affective and cognitive perceptions and understandings associated with nature. The nine value categories provided a starting point analysis to examine children’s interview transcripts and documents for “dispositions associated with the human inclination to affiliate with the natural world” (Kellert, 1996, p. 26).

I coded the interview and document data using Kellert’s nine values but because the broad values were difficult to identify in children’s actions, behaviors, and words, I created additional themes and subthemes for each value. These themes and subthemes emerged from the children’s language and allowed me to operationalize and elaborate Kellert’s (1996) functional definitions of the nine nature values.

In the next section, I provide a detailed description of how I identified the values, themes and subthemes in the interview and document data. Because of the importance of these coding categories for understanding children’s expressions of biophilia, I discuss how I identify each of the nine values in relation to children’s affective and cognitive perceptions and understandings of nature during Mountain Explorations. Then, to illustrate the values and descriptions, I provide examples from the coded transcripts. In my examples I indicate the values using boldface and the themes and the subthemes in lower case italics. I have organized the values in related but not exclusive sets. The scientific-ecological, naturalistic, symbolic tend to be more cognitive in their expression. The aesthetic, humanistic, negativistic values tend to manifest emotionally and the moralistic, utilitarian, and dominionistic values are associated with broad belief
orientations that often involve a combination of aesthetic, emotional and cognitive perspectives (Kellert, 1996).

I identified the scientific-ecological value in my data when children’s responses were associated with systematic study of nature that emphasized interdependence among species and natural habitats. According to Kellert (1996), a scientific understanding of nature emphasizes morphology and physiology of organisms, while the ecological perspective “is a more integrative approach to the natural world emphasizing interdependence between species and natural habitats” (p. 13). I have found that many children observe nature to further their empirical knowledge of the world. They enjoy learning about an individual species or community of interacting organisms. When children’s observations become more systematic they are able to make meaningful predictions and inferences.

As children build an ecological perspective, they focus on the interdependence of organisms and natural habitats (Kellert, 1996). I created three themes for the scientific-ecological value to reflect the ways in which children engaged with nature: observation (e.g., carefully observing animals and plants), systematic study (e.g., comparing and classifying organisms, predicting or inferring), and interconnection (e.g., making connections among living and nonliving components of an ecosystem). The following interview responses show how children express a scientific-ecological value for nature:

There’s like this tree in my yard and there’s a lot of these little brown birds that they’re all flying around all over the place and once there was this gray bird with a white chest and it had a black head, I didn’t know who it was though. (scientific-ecological, observation) (Hannah, Pre-Program interview, September 15, 2008)

I learned about animal tracks, skulls and diets. Did you know that Grey Wolves are now rare but their species is coming back again? There is actually a family of
I identified the **naturalistic** value in interviews and documents, when children’s responses indicated their playful exploration of nature. According to Kellert, the naturalistic value is based in the pleasurable activities of discovery and exploration of nature’s complexity and variety similar to the activities of a naturalist. Though a naturalistic value is often expressed through recreational activities such as birding, fishing and hunting, Kellert maintains that it includes childlike curiosity in the natural world and involves direct experience and exploration of nature. I created two themes for this value: *exploration* (e.g. quests that lead to discoveries in nature such as exploring a stream) and *play* (e.g. frolic or imaginative games that make use of nature’s elements such as using leaves and boughs to build simple shelters, forts and fairy houses). The following responses show how children express a naturalistic value:

We like get on our boots and old stuff and we look around for animals. One time I found this cool looking beetle, it was like that big and it was crawling around so I was following it. And I like made a little home out of grass and stuff for him and I tossed him in like the little worms I just thought they liked it. (*naturalistic, exploration, play*) (Carmen, Pre-Program interview, September 15, 2008)

I hadn’t really ever seen a waterfall before and I got to actually play in it. So, that was really awesome. I loved it. (*naturalistic, play*) (Ava, Post-Program interview, October 22, 2008)

Kellert describes symbolic value as use of nature for language and thought (1996). I identified the **symbolic** value in interviews and documents, when children’s responses illustrated that they viewed nature as a medium for communication, thought, and expression. I created three themes within the symbolic value: *poetry* (e.g., use of nature to render communication more vivid and persuasive); *story/fantasy/dream* (e.g.,
use of nature to tell a story), and *anthropomorphism* (e.g., ascribe humanlike feelings to animals and plants). The following interview responses show how children express a symbolic value for nature:

Oh, like maples, they love the sun because they are attracted to it. *(symbolic, anthropomorphism)* (Spring, Post-Program interview, October 22, 2008)

The last night I opened a window, it was too hot in the room and I heard a bear. It sounded really loud! I closed the window. I only heard it. *(symbolic, story/fantasy/dream)* (Jesse, Post-Program interview, October 22, 2008)

I identified the value of **aesthetic**, when the children’s responses indicated an appreciation for the beauty of nature. According to Kellert (1996), an aesthetic experience (e.g., natural vista, blooming flower, flock of birds in flight) evokes feelings of pleasure and awe at the beauty of the natural world. Key elements of the aesthetic response include reference to “vista, prospect, color, light, contrast, texture, movement” (Kellert, 1996, p. 14). Kellert suggests that the aesthetic perspective often focuses on the large, colorful, day-active animals including charismatic megafauna like bears, cougars, deer and wolves. However, I had observed during Mountain Explorations field activities that children also attend to small animals like squirrels and tiny colorful birds. These small animals are accessible, abundant and easy to watch. Children find them approachable and beautiful.

I found that children’s aesthetic expressions are provoked by a range of experiences in nature from viewing a grand mountainous *vista* to finding simple appeal in the diversity of the living green *forest* to watching a wild *animal* like an iridescent blue jay. Thus to identify and represent the aesthetic aspect in children’s responses, I created one theme, *beauty of nature* to capture responses that focused on the physical appeal of
nature. I also created three subthemes. The *animal* subtheme for when children spoke or wrote about beautiful colors, movements and behaviors of wildlife; the *forest* subtheme for responses about color, light, smells and variety of flora; and *vista/scenery* subtheme for references to landforms such as glaciers, mountains and lakes. The following interview and document responses illustrate how children respond aesthetically to nature:

I could feel the wind against my face. I couldn’t have imagined the beauty of Mountain Explorations. From the dock, it [lake, mountains and forest] looked so superb! (*aesthetic, beauty of nature, vista/scenery*) (Jacob, PTA Letter, September 24, 2008)

It [nature] is beautiful, there are lots of animals and there is a bunch of things to do. Just being around the trees and seeing all the animals. I figured out there are a lot more trees in the world than I really thought. Everything is so different and beautiful, a bunch of colors. (*aesthetic, beauty of nature, forest, animals*) (Nick, Post-Program interview, October 22, 2008)

I identified the **humanistic** value when children’s responses indicated love or an *emotional attachment* to the natural environment, a specific animal or place. Kellert (1996), defines humanistic value as “strong emotional attachment and love for aspects of nature” (p. 38). Kellert notes that the humanistic value is often directed toward animals but may also be directed toward prominent landscapes like mountains and seashores. I found that children expressed their emotional connection to nature through affirmations such as “I love nature,” “It’s cool,” or “Awesome.” Thus, I created the theme of *attachment to nature* for children’s humanistic expressions. I also created three subthemes to further characterize the ways children described their attachment to nature: *relaxation* (e.g. attachment to a place through a restful activity), *reflection* (e.g. attachment to a place through immersion and contemplation in a favorite outdoor spot), and *respect* (e.g. deep reverence, deference, respect and
affiliation for some aspect of nature). The following data excerpts show how children express a humanistic value for nature:

My favorite place is my backyard to read in the shade of my tree and sometimes I climb up into my tree because there is a big space in it where you can just sit down and enjoy the view and there are lots of bugs. (humanistic, emotional attachment to nature, relaxation, reflection) (Madison, Pre-Program interview, September 17, 2008)

Because, if you grow up, and you want to be a country boy – you can go out in nature and learn like at Mountain Explorations. Yeah, I like nature now – I wanted to see the bear, but it woke up and walked away. I would love to see a bear because I like seeing animals and bears are big and fast and cool – and the momma bear protects its babies! (humanistic, emotional attachment to nature, respect) (Anthony, Post-Program interview, October 22, 2008)

So far, I have only emphasized values associated with children’s positive emotional responses to nature, but as Kellert (1997) points out, the functional tendency to express fear and to avoid certain elements of nature is also important. I identified the negativistic value when children’s responses to nature were associated with fear and some threat emanating from nature. According to Kellert, the negativistic value is based in fear, aversion and dislike of nature. He found that certain animals (e.g. snakes, spiders and large predators), and landscapes (e.g., swamps and caves) and weather, (e.g., strong winds) provoke fear in people. Kellert suggests that human fears can result in destructive actions and cruelty toward nature such as killing top predators to make the mountains safe for humans, but can also promote healthy distancing and respect for nature. In my data analysis, I found that children expressed a negativistic value through their tendency to avoid certain animal and plant species, through their fear of cliffs and steep trails, and by their responses that indicated dislike of extreme weather.

For the negativistic value, I created the theme of fear/threat plus nine subthemes: heights (e.g., cliffs, steep trails and exposure), weather (e.g., storms, wind, rain), plants
(e.g., stinging nettle, thorn bearing plants like blackberries), **animals** (e.g., rodents such as mice), **predators** (e.g., bears and cougars) **insects** (e.g., spiders, bed bugs and mosquitoes) **dark** (e.g., night, losing one’s way without light), **getting lost** (e.g., getting lost on the trails deep in the wilderness), and **people** (e.g., strangers in the woods). The following responses show how children express a negativistic value for nature:

Occasionally [I’m afraid], when I’m out and it’s pitch black outside – because I sometimes see stuff. (**negativistic, fear/threat, dark**) (Ava, Pre-Program interview, September 15, 2008)

I’m afraid of being attacked by a bear. (**negativistic, fear/threat, predators**) (Jarrod, Pre-Program interview September 15, 2008)

I identified the **moralistic** value when children’s responses were associated with discerning a “basic kinship binding all life together” or represented an ethical concern for nature (Kellert, 1996, p. 23). For the moralistic value I identified three themes: **concern** (e.g., acting with compassion for nature), **ethical treatment** (e.g., giving wildlife space), and **etiquette** (e.g. taking care not to trample plants). The following interview responses show how children express a moralistic value for nature:

My wish is for people to stop abusing animals and I want to become a vegetarian. (**moralistic, ethical treatment**) (Alexa, Post-Program interview, October 22, 2008)

We heard its cubs, too. We had to go further down into the woods because the other trail group was herding it down where we were because they were making too much noise and they said “Shhhhh.” (**moralistic, concern, etiquette**) (Avery, Post-Program interview, October 22, 2008)

You can affect nature in a bad way by using a lot of gasoline and making plants die and cutting down trees, it actually affects you, too. (**moralistic, ethical treatment, concern**) (Olivia, Post-Program interview, October 22, 2008)

I identified the **utilitarian** value in my data when children’s responses indicated that they viewed nature as providing utility or a material benefit. Kellert (1996) describes
utilitarian value as “practical and material exploitation of nature” (p. 38). I created two themes for the utilitarian value: hunter/gatherer (e.g., gathering berries to eat or to dye cloth, building a slingshot to “hunt” animals) and photos (e.g., “capturing” nature on film). While taking photos usually does not satisfy the traditional notion of material benefit derived from exploiting nature to satisfy human needs, I argue that “capturing” nature digitally or on film, constitutes a utilitarian “taking.” As a recreational activity in nature, children, like adults, can become focused on capturing a view or catching a wildlife shot as they record their experiences. In my field research, many children carried cameras and saw nature foremost through their camera lens. The following responses show how children express a utilitarian value for nature:

Instead of buying chairs, we could either sit on a rock or something, and instead of buying wood you could get sticks and stuff. (utilitarian, hunter/gatherer) (Paige, Pre-Program interview, September 12, 2008)

I’m afraid I may not get any pictures of animals at Mountain Explorations. (utilitarian, photos) (Jarrod, Pre-Program interview, September 9, 2008)

I did not identify Kellert’s value of dominionistic value in interviews or documents. While children in this study indicated awareness and understanding of what would represent a dominionistic perspective, they did not express a need to dominate, master or suppress nature. The following interview response shows how children understand a dominionistic value:

I affect nature by cutting down trees. (dominionistic understanding) (Koby, Post-Program interview, October 22, 2008)

To help me organize and display the coded interview and document information of values of nature I constructed a data table for each student. Table 3.5 provides an illustration of how I organized coded data for each student in the study. Two additional
individual student tables are included as Appendix B. The tables for each of the children were then used to create a composite table representing all 35 children’s expressions of environmental values. This composite table provides a synopsis of the range of children’s expressions of environmental values in nature.

By combining the coded interview and document data with observations of children’s experiences in nature, I could evaluate how the Mountain Explorations program aroused biophilia. In documenting children’s environmental values, I was, in essence, tracking their expressions of biophilia. These findings are reported in Chapter 5, where I discuss children’s perceptions and experiences in nature in relation to children’s expressions of biophilia and Chapter 6, which provides a close look at three children’s experiences in nature to illustrate the effect of particular experiences in nature on children’s expressions of biophilia.
Table 3.5 Anthony’s Expressions of Environmental Values

<table>
<thead>
<tr>
<th>VALUES</th>
<th>Themes &amp; Subthemes</th>
<th>Pre-Program</th>
<th>Day 1-3</th>
<th>Post-Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Interview</td>
<td>Document</td>
<td>Interview</td>
</tr>
<tr>
<td>Scientific-Ecological</td>
<td>Systematic Study Observation Interconnection</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Naturalistic</td>
<td>Exploration Play</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbolic</td>
<td>Poetry Story/fantasy Anthropomorphism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetic Appeal</td>
<td>Beauty of Nature Animals Forest Vista/Scenery</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Humanistic Love</td>
<td>Attachment Emotional Relax Reflect Respect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negativistic Aversion</td>
<td>Fear/Threat Heights Weather Plants Animals Predators Insects Dark Getting Lost People</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moralistic</td>
<td>Concern Ethical Treatment Etiquette</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilitarian</td>
<td>Hunter/Gatherer Photos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominionistic</td>
<td>Suppress nature</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Limitations of the Study

To enhance the internal validity of qualitative research, Merriam (1998a) suggests that the researcher clarify his or her “assumptions, world view and theoretical orientation” (p. 205). To do this I report on some of my assumptions and beliefs about nature and environmental education that underlie my research. First, I am a life-long naturalist who shares Lopez’s (2001) view that a naturalist, “knows a local flora and fauna as pieces of an inscrutable mystery, increasingly deep, a unity of organisms Western culture has been trying to elevate itself above since at least Mesopotamian times. The modern naturalist, in fact, has now become a kind of emissary in this, working to reestablish good relations with all the biological components humanity has excluded from its moral universe” (p.2).

As a naturalist, I have spent long periods steeped in adoration of natural communities. After years of banding seabirds on remote coastal islands in Maine, performing rare plant surveys in the mountains of Cascadia and arid grasslands of the Great Basin, studying forest succession on rapidly deglaciating peninsulas, observing raptor migration on nunataks in Southeast Alaska and following birds across the northern hemisphere to Central America, I can safely say that I have nurtured a strong biophilic sense. I simply love nature, its nuanced smells, its refreshing touch, the familiarity of its endless soothing layers ease my spirit.

Given my focus to study biophilia in action through children’s perceptions of nature, it is important that I attend to my own affective and cognitive expressions of biophilia. Irrespective of whether my biophilic sense is innate or learned, my experiences
in nature have certainly strengthened my own disposition to love nature and have strengthened my appreciation of the human quest to affiliate with the natural world.

As an emissary of the natural world, I see environmental education as heightening environmental literacy with the goal of creating a sustainable environment. Inherent in this view, is the assumption that environmental education is education for social and environmental change through a process of collective action (Elder, 2007). I assume that environmental education can improve relationships among humans and between humans and their environment (Wals, 1994b). I also view environmental education as a potent means for educational reform rather than as a tool to modify children’s behavior with a predetermined endpoint in mind (Elder, 2007; Orr, 1996; Wals, 1994b). Only by giving children the resources (i.e., environmental knowledge, experiences in nature and time to reflect), can they begin to engage in a wider participatory process of societal and environmental change.

As I attempt to document emergent biophilia in children, personal bias is unavoidable (Janesick, 2003). In light of my naturalist’s presuppositions, I have endeavored to make my study of children’s experiences in nature and expressions of biophilia as unbiased as possible.

**Reflections on My Role as Participant/Researcher/Observer**

For the duration of this study, I was an integral member of the learning community in the classroom and field rather than a distant observer. As a participant, I engaged in all aspects of the program with the children including hikes, learning activities, games, discussions, meals and evening programs. In my role as naturalist
educator, I helped children make observations, record notes and build interconnections within forest ecosystems. In my role as a researcher, I investigated children’s Mountain Explorations experiences through interviews, observations and collection of children’s written work. My multiple roles and integration with the community allowed me to genuinely live the experience of Mountain Explorations while providing insights during data analysis (Atkinson & Hammersley, 1994).

Throughout this study, I repeatedly reflected on the effect my own perceptions of nature have on my impressions of children’s expressions of biophilia. It is because of my strong biophilic sense, that I appreciate children’s emergent expressions of biophilia as worthy of study. However, the same strong sense can influence what I see. Thus, I must address the issue of trustworthiness in this study. In other words, I need to consider whether I am simply verifying my own biases or whether there is empirical evidence of meaningful connections between Mountain Explorations and children’s expressions of biophilia.

**Trustworthiness**

To demonstrate trustworthiness within a qualitative framework, Lincoln and Guba (1985) establish four criteria that must be considered: credibility, transferability, dependability and confirmability. In this section, I discuss each of these criteria in relation to my study of biophilia. The italicized words in the next few paragraphs are strategies suggested by Lincoln and Guba (1985) and Merriam (1998a) to insure trustworthiness.

Credibility refers to a researcher's ability to demonstrate that the study is believable from the perspective of the participant in the study and critical readers
(Lincoln & Guba, 1985). To establish credibility of my findings, I employed three strategies recommended by Lincoln and Guba (1985): *prolonged engagement, triangulation* and *member checking*. I attended several sessions of Mountain Explorations during my pilot research. This *prolonged engagement* over multiple seasons allowed me to better understand the Mountain Explorations program and culture. Being in the field with the students for long periods, allowed me to engage in persistent observation that helped me to identify both salient and atypical factors relevant to biophilia. Also by discussing my research with colleagues during *peer examination* sessions, I was able to probe my biases, reflect on new questions and refine my methodological design (Merriam, 1998a).

To further ensure credibility during my study, I also employed *triangulation* by utilizing multiple data sources including interviews, naturalistic observations, field notes, and samples of student work. In addition, during Mountain Explorations, I continuously employed informal *member checks* with children to identify observer error, investigate potential observer misunderstandings and glean new insights into children’s perception of nature.

I transcribed the interviews verbatim, and as a formal *member check* during Post-Program interviews, I shared individual children’s perceptions of nature with the children themselves. By reading transcripts of their initial thoughts about nature, children were able to make additions and changes to clarify the transcripts. This was an important step since I used this data to describe Mountain Explorations and biophilia through the eyes of the children.
Transferability refers to the degree to which my findings can inform other situations in similar contexts. To achieve transferability I employed two methods suggested by Lincoln and Guba (1985), *thick description* and *purposeful sampling*. By drawing on interviews, observations, and documents I was able to generate richly detailed accounts of the educational activities and nature experiences of children. These are presented as Mountain Explorations vignettes. My *purposeful sampling* and in-depth examination of three students’ Mountain Explorations experiences and perceptions of nature allowed me to create detailed stories of children’s experiences in nature. Lastly, by providing a detailed description of the study’s context and the assumptions that were central to the research I enable the reader to judge the transferability of the findings and appropriateness of the *fit* with their own situation (Merriam, 1998a, p. 211).

To increase the dependability and confirmability of my research, I kept detailed records of my data, findings, interpretations and recommendations. To establish that my findings are supported by my data I employed a technique that Lincoln and Guba (1985), refer to as an *inquiry audit* (p. 317). I asked a colleague to serve as an “auditor,” to code a portion of the interviews and compare that coding with mine, review my documents and authenticate the decisions and accounts that support my findings (Merriam, 1998a, p. 207).

**Ethical Considerations**

During my study, I frequently consulted and carefully took into account Miles and Huberman’s (1994) suggestions regarding research ethics that include establishing competency boundaries for quality research, obtaining informed consent, minimizing harm and risk to participants, establishing honesty, trust and reciprocity, and ensuring
privacy, confidentiality and anonymity. I also attended to Flinders’ (1992) ecological considerations that include: cultural sensitivity, avoidance of detachment and responsive communication.

I employed a number of strategies to insure that all ethical guidelines were met for my study. Before I began work with students and teachers, I obtained full permission from the Behavioural Research Ethics Board at UBC (See Appendix D for Ethics Approval). Next, I received permission from the Assistant Superintendent of the local school district, the Program Director for Mountain Explorations, and the principal of the participating elementary school.

In cooperation with the classroom teachers, I explained the proposed research and the voluntary consent form to the students in the two classes. Students were informed about this study and were invited to participate. I obtained written and informed consent from the parent/guardians and verbal informed consent from the children. Students who chose not to participate in the study or whose parents did not give consent were not treated differently than students with consent. They were full participants in all aspects of the Mountain Explorations activities but were not observed, photographed, or interviewed. All participants understood that they could withdraw from the study at any time without penalty. Lastly, I used pseudonyms for all participants, school districts, the learning center and program to ensure anonymity, privacy and confidentiality.
CHAPTER FOUR

MOUNTAIN EXPLORATIONS VIGNETTES

In this chapter I tell the story of the Mountain Explorations program as experienced by students from Flynn Park Elementary through a series of vignettes. By sharing narrative vignettes of students’ experiences in nature, I endeavor to deepen the readers’ understanding and appreciation of Mountain Explorations as a context for examining biophilia. In providing an initial description of students’ experiences at Mountain Explorations, the vignettes lay the groundwork for Chapters 5 and 6 in which I further demonstrate how responses to Mountain Explorations activities contribute to students’ expressions of biophilia.

For the purposes of this study, I define Mountain Explorations to include the initial introductory visit by Mountain Exploration staff to the elementary classroom, and the three days that the children spend at the Cascadia Learning Center. The vignettes are structured around seven different Mountain Explorations events that children participate in during this environmental education program. The vignettes illustrate the breadth of the Mountain Explorations program and offer a first glimpse of how the ecosystem theme is woven into the entire program. Figure 4.1 shows a sample schedule of events that take place at Mountain Explorations including the Pre-Program visit.
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00</td>
<td>Mountain Explorations program, environment, food, lodging, packing</td>
</tr>
<tr>
<td><strong>DAY 1 Abiotic Day</strong></td>
<td></td>
</tr>
<tr>
<td>12:30</td>
<td>Arrive at Learning Center &amp; unload bus</td>
</tr>
<tr>
<td>1:00</td>
<td>Student orientation &amp; chaperone meeting</td>
</tr>
<tr>
<td>1:30</td>
<td>Field study in trail groups</td>
</tr>
<tr>
<td>4:30</td>
<td>Return to amphitheater for regrouping and games</td>
</tr>
<tr>
<td>5:00</td>
<td>Students move into lodges &amp; FREE TIME</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner &amp; FREE TIME</td>
</tr>
<tr>
<td>7:00</td>
<td>FREE TIME</td>
</tr>
<tr>
<td>8:30</td>
<td>Return to lodges. LIGHTS OUT AT 9:30</td>
</tr>
<tr>
<td><strong>DAY 2 Biotic Day</strong></td>
<td></td>
</tr>
<tr>
<td>8:00</td>
<td>Breakfast, Free time</td>
</tr>
<tr>
<td>9:00</td>
<td>Field Study</td>
</tr>
<tr>
<td>4:30</td>
<td>Return to amphitheater for regrouping and games</td>
</tr>
<tr>
<td>5:00</td>
<td>FREE TIME</td>
</tr>
<tr>
<td>6:00</td>
<td>Dinner &amp; FREE TIME</td>
</tr>
<tr>
<td>7:00</td>
<td>EVENING PROGRAMS</td>
</tr>
<tr>
<td>8:30</td>
<td>Return to lodges. LIGHTS OUT AT 9:30</td>
</tr>
<tr>
<td><strong>DAY 3 Community and Reflection Day</strong></td>
<td></td>
</tr>
<tr>
<td>7:30</td>
<td>Move out of lodges, clean lodges, check out</td>
</tr>
<tr>
<td>8:00</td>
<td>Breakfast &amp; Free time</td>
</tr>
<tr>
<td>9:00</td>
<td>Field study</td>
</tr>
<tr>
<td>11:00</td>
<td>Closing Circle</td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch, load bus, &amp; depart</td>
</tr>
</tbody>
</table>
Vignette 1: Getting Ready and Travel

A week before our Mountain Explorations trip, I visit Flynn Park Elementary Explorations to interview 35 students in two 5th grade classes. I tell Ms. Morino and Ms. Ashby that interviews tend to go better if I can have a few minutes to build trust and rapport by addressing all the children. This is only my second visit to the classroom, so I remind the children about my research with Mountain Explorations and describe myself as a naturalist with a love for birds, possessing an inordinate fascination for owls and chickadees. The children immediately resonate with my enthusiasm for the natural world as evidenced by the number of hands that shoot-up with questions. I was somewhat surprised yet entirely pleased by their earnest enthusiasm. Our discussion initially centers on avian superlatives.

The children are eager to have command of this new subject, and start accumulating discrete facts about birds. They begin asking me about extremes, “What is the biggest or smallest bird?” “What is the fastest bird?” After engaging these questions, I decide to broaden our experience by sharing something more visceral – owl vocalizations. Children describe the flying saucer sound of the Saw-whet Owl that I vocalize as “rhythmic” and “alien.” We practice the airy shriek of the Barn Owl; it was “spooky” and “creepy.” The Barred Owl is described as “awesome.” As children become more conversant speaking owl, I notice an increased enthusiasm and inquisitiveness about bird behavior.

The rest of the morning and afternoon I conduct my individual Pre-Program student interviews. I build on my initial impressions of children’s perceptions of nature during the semi-structured interviews when I ask children to describe nature in their
neighborhoods. Later that morning, Leo, one of the Mountain Explorations instructors visits the classroom for 45 minutes to prepare children for their adventure. I sit in the back of the classroom observing and taking notes.

Leo begins by giving each student a blue Mountain Explorations journal that describes and supports trail activities as well as providing preparatory and post instructional strategies. Children eagerly engage in a short pre-assessment activity that asks them to write their initial ideas about nature. I wander through the class to monitor and document children’s initial understanding of their relationship with nature. Spring writes:

I think nature is . . . a beautiful place where plants and animals live.
I affect nature by . . . recycling.
Nature affects me by . . . taking carbon dioxide and turning it into oxygen for me.
My favorite outside spot is . . . the creek behind my apartments.
(Spring, Mountain Explorations journal, pre-program, September 9, 2008)

Listening and recording children’s questions and comments during Leo’s slide illustrated introduction to Mountain Explorations helps me understand their previous experience in the mountains and their expectations for the program. Children try to imagine nature in the mountains but a 7-million acre wilderness known for its steep slopes, ever-flowing streams and tremendous biological diversity is difficult to readily embrace through photos. When presented pictures of snowfields on rugged and heavily glaciated mountains, children ask about the differences between cascades and waterfalls and then glaciers and snow/ice. Leo describes the mountainous landscape, “Yes, that is why they are called the North Cascade (stated with added emphasis) Mountains, there is abundant rain that forms many tumbling waterfalls and snow that compacts into glacial ice. I like to think of them as a national treasure, a living laboratory awaiting your
discovery” (Leo, researcher field notes, September 8, 2008). This alluring vision of nature inspires students as indicated by comments like Maria’s:

The first day I heard about Mountain Explorations I could hardly wait. (Maria, letter to PTA, September 24, 2008)

Then, anticipating students’ primary interests – lodging and dining at Mountain Explorations – Leo shifts the discussion to the physical infrastructure of the learning center.

Leo shows pictures of the Cascadia Learning Center located on the shores of Diablo Lake. As he talks about the numerous trails and three trailside-learning shelters, I notice that the children focus on pragmatic questions. They excitedly ask, “Where will we sleep? Where will we eat?” Using a birds-eye-view photo of the 16-building facility that includes classrooms, labs, library, dining hall and lodges, students locate their sleeping lodges. Photographs and a Map of the Cascadia Learning Center are included in Appendix C. The fact that the dormitory styled rooms would be shared with only two other friends inspires imaginative visions of Mountain Explorations.

I had images in my head of us hiking in the forest. I imagined leaves crunching under my feet, chipmunks sneaking in the undergrowth. I also imagined our lodges. I imagined lodges looked like a room royal enough to fit a princess. (Madison, letter to the PTA, September 24, 2008)

Everyone responds enthusiastically when they hear about the kid friendly food (pizza, tacos, pancakes) cooked by chef Sam. “You mean we can eat as much as we want?” asks Jarrod incredulously. “Yes,” responds Leo, “much of our food is grown in the Skagit Valley but we strive for zero waste at each meal.” Leo tells the children that a foodshed is like a watershed. He continues, “Foodsheds outline the flow of food that feeds a particular community. During Mountain Explorations, we will study the many
interactions in forest food chains. While we are in the wilderness, we will also study the food chain that connects farms with our dining table and our garbage and waste” (Leo, researcher field notes, September 8, 2008). Though most of the children recognize the term *food chain*, no one can actually describe a food chain. For the time being, food abundance at the Learning Center is more provocative than food origin or food waste, particularly since the children are eager for their own lunch period that begins in 30 minutes.

Next, children receive a glossy park service map so they can follow the Skagit River from the ocean to the headwaters in Canada. The Skagit River provides a natural connection between the mountains and the children’s coastal communities. Leo takes us on a virtual tour of the Skagit watershed, illustrated with Power Point slides. As children gain an initial understanding of the scale and natural diversity found of the North Cascades ecosystem, they gleefully call out the names of animals as they appear on the screen, “Frog, Ooooo – deer, chipmunk, squirrel, slug – I thought slugs were brown!” Most children have seen brown slugs but not the green native banana slug.

Many of the children announce that they have never seen a deer in the wild. Others are unaware of the differences between a squirrel and a chipmunk. Most of the children are thoroughly excited for the opportunity to watch wildlife and learn about animals at Mountain Explorations. This is evident in their resounding willingness to be five minutes late to lunch so that Leo can explain what to pack for their upcoming 3-day experience.
Vignette 2: Departure Day

It is departure day. Children eagerly rally at the school parking area with their sleeping bags and packs ready to go. The underside of the yellow school bus bulges with multicolored luggage, pillows, daypacks and ponchos. The excitement in the bus is tangible. Ms. Morino tells me that for many of the students this is their first trip to the mountains and they try to imagine two nights away from home deep in a wilderness. As students make the exciting journey south on the Interstate highway they catch glimpses of the snowy mountains to the east. Far up the Skagit River watershed they will reach the Cascadia Environmental Learning Center located in North Cascades National Park, in the heart of the North Cascades mountain range.

Our arrival at the National Park Visitor Center is arranged quite pragmatically around our need for bathrooms and lunch. We also get to explore the multimedia displays that include dioramas of the North Cascades ecosystems, interactive maps and hands-on activities. Children take a short level hike on an elevated boardwalk. As an educational activity, a Park Ranger has hidden cardboard cutouts of birds and animals in the trees along the trail. To practice their observation skills, children happily search for the hidden “animals” in the trees along the trail. The short hike terminates in a breathtaking view of the heavily glaciated and snowy Picket Range. Children are awestruck by the beauty:

This walk is no ordinary walk, we had to find certain cardboard birds on trees, bushes and logs. When we got to the end of the walk, there was a perfect view of the mountains. (Maria, PTA Letter, September 24, 2008)

I wish I could fly to the beautiful white snow. (Olivia, field notes, September 17, 2008)

Crossing Diablo Dam in a school bus is awe-inspiring. Children in the down river seats stare down a 389-foot concrete cliff to a yawning gorge. Children in the up river
seats stand up to view the vast expanse of aquamarine Diablo Lake cradled in craggy mountains. Iris, the Mountain Explorations instructor who joined us, offers calmly, “Before 1930, when the Skagit River was still free flowing, fish like salmon were prevented passage by the roaring waters through the precipitous river gorge.” “Wow,” children murmur as they imagine the roaring waters holding the salmon back. Looking down the river, children exclaim over the magnificent gorge:

Soon we got to the Dam-Gorge. It was 300 feet down! The dam also had a huge cascade. Everyone stood up to take pictures and look down. You could hear a lot of “Whoas” and “Cool.” (Maria, PTA letter, September 24, 2008)

Rounding the lake, we arrive at the Cascadia Learning Center gate where the bus stops. Children pour onto the gravel:

7,6,5,4,3,2,1, yea we’re here! When we got to the Learning Center everyone was whooping and cheering. (Olivia, PTA letter, September 24, 2008)

The children, chaperones and teachers gather armloads of luggage for the short walk to the lodges. Another grade 5 class is lined up along the trail singing the Banana Slug Song. They will ride our bus home. As we pass along the trail, children shout to friends, “You’re going to love the trails! I want to live here and never go home. Have fun!”

Children are excited to finally see their wilderness home. Ready for adventure, everyone temporarily piles their luggage under a canopy at the office before descending the rock stairs to the sunny amphitheater.

Vignette 3: Abiotic Day and Web of life

It is Abiotic Day and the over arching question for today is, “How do the nonliving parts of the North Cascades Ecosystem shape the landforms in the ecosystem?” Children will investigate this guiding question through a variety of trail activities (see
Figure 4.2. Abiotic Day Themes, Topics and Guiding Questions). It is noon and the sun warms the amphitheater as our three trail leaders perform a series of hilarious and interactive skits designed to set expectations and group norms about respecting each other and nature, the wilderness bathroom, never wandering off and food etiquette.

   The three trail leaders model ways to limit our impact on the trails and forest community during a Trail Tips skit. One of the trail leaders plays an innocent flower growing in a clump of moss along the trail. When the lovely flower is accidently trampled by a child, the wilting flower reminds us to “please stay on the trails to protect the green plants.” After learning the mantra from the trail leaders, children repeat in unison, “Hey, don’t bust the green!” (researcher field notes, day one, September 17, 2008).

   Sitting on the sunny benches, children begin to unpack their sack lunches. After fifteen minutes of quiet eating, the trail leaders model expectations for food etiquette with a funny skit depicting a chipmunk with a sore belly from eating too much human food and candy. They conclude with a clear set of expectations:

   Today, food waste goes in this bucket, paper waste in this box and plastic goes in this tub. When you are done eating, ALL (capital for emphasis) extra food and CANDY goes in this box, not back in your backpack. The animals that live in the park have their own food and habitat. We don’t want to encourage mice to leave their homes and come in our lodges! (Leo, researcher field notes, day one, September 17, 2008)

   When a child inadvertently drops a bread crust or wrapper, they are reminded of the connections between human food and wildlife. Children are happy to comply and the extra food and candy box fills with treats as they quickly tidy the amphitheater.
DAY 1 THEME: ABIOTIC

Overall Guiding Question
How do the nonliving parts of the North Cascades Ecosystem shape the landforms in the ecosystem?

Topics and Guiding Questions
Introduction to the Web of Life
- What are the connections between the abiotic elements in the ecosystem and all forest life?

Trail Tips
- What are ways to practice ways to limit our impact on the trails and forest community, i.e., Leave No Trace?

Water and Glaciers in the North Cascades
- How do glaciers and water shape valleys?

North Cascades Geology
- How does the rock cycle affect our understanding of the North Cascades Ecosystem?
- Why don’t we find fossils in this part of the North Cascades?

Weather
- How does the Orographic lift affect our weather?

After lunch, a “bluebird” raucously arrives at the amphitheater riveting the children’s attention for several minutes. Children crane their necks and climb on the benches to get a better look at the Steller’s Jay’s animated behavior. Several children point and describe the jay’s behavior to their friends:

See, the jays stabbing the pinecone – there! Now it’s flying to the rocks, see it, over there? Now it’s poking in the dirt. Hear it call? (researcher field notes, day one, September 17, 2008)

As children try to make sense of this fascinating food caching behavior, the trail leaders encourage first-hand observations of the jay. Leo asks probing questions, “What do you see? What is the jay doing now? Why is it doing that?” Children speculate freely:
It could be planting seeds. Maybe the jay is hiding things. But how will it remember? (Ava, Hannah, Carmen, researcher field notes, day one, September 17, 2008)

I am struck at how easily this serendipitous event sets the expectation for student driven inquiry here in this mountain wilderness.

By 1:30, everyone is restless after the long bus ride, skits and lunch. We prepare to join our trail groups. “Black Bears meet over by the fir tree,” shout the trail leaders, “Black-tailed Dear by the boulder” and “Cougars follow me, this way by the maple!” Each trail group consists of an instructor, eight students and two chaperones. Students settle quickly into their groups. I am assigned to join the Cougars for the rest of the day. The parent chaperones have just returned from an orientation meeting in the large classroom and our instructor, Kip, creates a warm and inviting space to welcome everyone.

The children, parents, and teacher interact respectfully, lending a collegial feel to the learning community. Everyone is eager to participate including the parents that have volunteered to be Mountain Explorations chaperones. I recall from my previous experiences that parents are as eager and enthusiastic as their children for learning activities along the trail. Many parents are taking three days of vacation to learn about the wilderness with their children.

I take this time to deliver a 27-shot camera to each trail group, encouraging them to “capture nature” along the trails. I tell them that I will develop the film and share the pictures with each student back at the school. Since I cannot be with three trail groups simultaneously, I plan to use the pictures during Post-Program interviews to stimulate...
recall of Mountain Explorations experiences as a means to “see” nature through the children’s perspective.

Kip is serious about our safety and comfort as he prepares us with more *Trail Tips*. He asks the children to check the contents of their field packs for BRJWPLS. No sooner does Ethan ask, “What’s that?” when we are led to a supply hut and based on need we are issued a B (backpack), R (raingear), J (journal), W (water), P (pencil), L (lunch) and S (sit pad) before we start down the Peninsula Trail.

I pause to help Carmen adjust the shoulder straps on her pack. I notice that she is wearing one of the issued backpacks. She explains that her backpack broke and they couldn’t afford to buy another before Mountain Explorations. I am pleased that the program has extra BRJWPLS for the kids who could not provide their own field equipment. I notice that Hannah’s backpack from home is so big and full that I wonder if she can carry it around the Peninsula Trail. I follow along behind the group watching and listening as the students officially encounter the natural world on their first Mountain Explorations trail.

Kip announces to the Cougars, “I want you to make observations as we hike” but I notice that children are already fully focused on the life around them. Carmen exclaims over the green plant life, “I can’t believe we are here. It’s so green! Look at that moss!” Demonstrating an intrinsic interest in the life along the trail, children spontaneously announce to their trail group, each new sighting. “Wow, look at that white butterfly.” “I have seen these before!” “There’s a chipmunk, I wish I had my camera!” “I see a lot of mushrooms. Can we take them to look in the microscopes?”
The pace is regulated to allow intimate observations and journaling. Kip encourages us to make field notes that include labeled drawings and he uses questions to guide our experience in nature. He asks us, “What did you see?” He asks, “What connections are you seeing between the abiotic or non-living elements in the ecosystem and the forest life?” The expressions on the children’s faces indicate they are confused. To help the children with this difficult question, Kip decides to teach us a game called *Web of Life*.

Everyone takes a card on a lanyard. Each card represents a component of the forest ecosystem. Kip is the Sun and starts the game by holding one end of a ball of green yarn and tossing the ball to the Douglas fir tree announcing, “The fir tree needs my sunlight, so we’re connected.” Douglas fir tree decides to toss the yarn ball to the Douglas’ Squirrel and states, “the squirrel eats my cones and nests in my branches so we are connected.” Now, there is a tight connection between the sun, tree and squirrel. Squirrel tosses the yarn ball to Water because, “I drink water and we are connected.” The game concludes when a yarn web connects all children as part of a connected ecosystem. A photo of this game is shown in Appendix C.3 Day One: Introduction to Web of Life.

To get a better view of the Pyramid Peak and warm-up our bodies, Kip teaches us to walk like a stealthy cougar. Children make exaggerated steps as their *paws* press lightly on the earth. Reaching a lakeside overlook, we pause, peering intently across Diablo Lake and then at the clouds surrounding Pyramid and Colonial Peaks.

Breaking their cougar persona, the children are eager to see and describe the cascading water and glacial ice shaping the mountainous landscapes of the North Cascade Mountains. Kip helps the children interpret the vista telling us that the distance is too
great to see an actual person. Catching our attention, he explains that Chef Sam climbs Pyramid Peak every year on his birthday. Incredulously, Anthony asks:

    But how does he climb ice without slipping? (Anthony, researcher field notes, day one, September 17, 2008)

To answer Anthony, Kip takes us on an imaginary mountaineering trip, through forests, past waterfalls, over talus and ice to the top of Pyramid Peak (a photo of Pyramid Peak is shown in Appendix C.6). Children smile while climbing their imaginary mountain.

Acting as though we are all exhausted from the strenuous climb, children breathe deeply, gasping for air. Kip rewards our hard work by teaching us a rousing song with hand movements about the Water Cycle. Everyone sings the chorus, “Evaporation-condensation-precipitation-saturation.” While we are singing, Ms. Morino and one of the chaperones are slapping mosquitoes. I wonder if mosquitoes are bothering the children too but I can see that their hands are following the motions for the song.

Resuming our cougar walk, we stride gracefully toward the beach near the Diablo Lake dock. Kip encourages the children to smell the fir needles, touch the bracket fungus and feel the cool wind over the lake. I can see this multisensory approach helps to draw children into nature.

We pause on the gravelly shore of Diablo Lake to study the rock cycle. Kip checks the group’s knowledge by asking a quick series of questions about North Cascades geology and fossils. I see children pick-up and hold stones, plunge their hands in the cold lake, peel bark from sticks and brush their hands through the blooming Woodrush (*Luzula sp*). As children experience the lakeshore environment they seem to find it difficult to pay attention to Kip’s instruction.
Kip catches our attention with an alluring question, “Do you want to make some fossils?” He extracts a bag of multicolored play dough from his field pack. Distributing a walnut-sized chunk of play dough to each Cougar, he asks us each to build a plant or animal fossil using the play dough. In the meantime, Kip makes a stack of flat play dough pancakes to represent layers of sediment. He directs us to carefully place our plant and animal fossils between layers of sediment. Then, passing the thick composite sandwich hand-to-hand, we each add another layer of colored play dough, squeezing the sandwich flat between our palms. Kip asks, “Why are there no fossils in the North Cascade Mountains?” Anthony speaks for the group:

Because the fossils are destroyed and flattened inside the mountains. (Anthony, researcher field notes, day one, September 17, 2008)

I reflect that the lesson hits home as the children are beginning to connect mountains and landforms with plant and animal communities, at least in terms of fossils. As we walk back to the lodges, I look forward to reading the Cougar’s Mountain Explorations journals for evidence of new understandings.

By 5:00 pm we have moved into our lodges and are enjoying a very short “free” time. The chaperones offer a variety of options: ball sports in the open play area, journaling on the floating dock and reading in the library. I head to the library with a chaperone and with Michael and Jacob, two boys both emphatically interested in birds.

Michael is fascinated with crossbills. He tells me they are the only bird with a bill that actually crosses at the tip. I tell Michael that the previous spring Red Crossbills had been abundant around the Learning Center buildings. I had documented ravens salvaging dozens of crossbills that had inadvertently crashed into the Learning Center windows. Since the notoriously nomadic crossbills are nowhere in sight outside, we decide to
investigate a library reference, the *Birds of North America* – a joint 10-year project of the American Ornithologists' Union, the Cornell Lab of Ornithology, and the Academy of Natural Sciences.

We locate and extract species account #256 from one of the file boxes. It represents the most current research available on Red Crossbills (*Loxia curvirostra*). As Michael peruses the natural history account of his favorite avian species another student, Jacob nestles in an easy chair looking at a picture book of birds. He is also wearing headphones and listening to bird songs (Elliot, 1997). Staring out the window at Colonial Peak, I reflect that our natural history library is nestled in one of the most biologically rich wildernesses in the world. Content and warm in the well-insulated room it did not occur to Michael or Jacob to go outside and watch real birds.

**Vignette 4: Meals and Foodshed**

I watch as children eagerly enter the dining hall along a double, self-serve buffet line. Bonny tells me that most kids and adults love the Mountain Explorations cooking. Kids load their plates with tacos, beans, rice, turkey, cheese and lettuce, and then choose from ten types of salsa and hot sauce. During the middle of the meal one of the instructors challenges the students to “Take what you want but eat what you take.” He holds up a bucket and announces, “We’re going to weigh our food waste each meal. Our challenge is to have less waste each meal” (researcher field notes, day one, September 17, 2008).

Tonight the Black Bears are the clean-up crew and they are busy cleaning the floors and tables. With the bucket of food waste in hand, Bonny takes them on a short trip
behind the dining hall into the bear-proof compost/recycling center. The thick metal gate is huge and Bonny tells us that the center is constructed like a fortress because the stench is unforgettable and is certainly a wildlife attractant. Children read the big poster on the wall asks that asks two questions, *Where does your food come from?* And, *Where does your garbage go?*

Even though there is plenty of ventilation, I am finding the smell emanating from the tubs quite strong. Holding her nose before lifting the hatch on the mechanized Earth Tub, Maria peers into the tub and then pours the night’s food scraps in the warm tub (see Appendix C.11 Day Two: How Does Your Garbage Grow?) The Cougars take turns slowly pushing the stirring rod 360 degrees around the tub. Peering into the hatch, Nick and Kenya grimace over the several cubic yards of warm, stinky compost slowly decomposing. Bonny tells us, “This is nutrient cycling in action. The fertile compost will end up in the gardens that grow our food in the lower Skagit Valley. Tomorrow we will study nutrient cycling in forest ecosystems” (Bonny, researcher field notes, day one, September 17, 2008).

Leaving the smelly compost center, the Black Bears head back to the amphitheater and Bonny reads the Shel Silverstein (1974) poem, *Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out* that humorously reminds us of how much garbage we produce. Next, we play a food game. Students are assigned a food from a certain country. Corn and a turkey from United States stand close by, but sugar cane from Brazil, rice from China and chocolate from Western Africa are spread across the field. On Bonny’s command, everyone races back to Bonny the *kitchen*. Children understand the distances and energy involved in food delivery as they shout, “I just ran all the way from
Brazil. Can I be the corn next time?” Children are panting and smiling, after three food races.

Races are over and Bonny introduces another game, the *Food Chain*. Handing out funny nametags to each child (e.g. corn plant, old taco shell, lettuce, human) she explains, “It is the type of game we played this morning with a twist, this time you are garbage, decomposing bacteria and garden plants. Let’s watch the nutrients flow through us as we pass the yarn ball.” Children are remembering and explaining the rules to each other before they begin to play. They are noticing some new words on the back of the cards: decomposer, producer and consumer. As the children are playing with these new concepts, I wonder if they are incrementally taking notice of their own connections to the local ecosystem.

**Vignette 5: Night Hike**

Our first evening at Mountain Explorations is windless, clear and cool. We all rally at the amphitheater with our warm layers of clothes, ready for the evening activity. We sing some songs and then at dusk, the trail leaders decide to take the entire group on a hike to Diablo Dam. We are assigned to small groups that are different from our trail groups. I am asked to chaperone three students; Anthony and Nick are largely silent while Ava happily chats. As we walk, the large group spreads out like a long knotted rope, undulating down the lakeside gravel road. When we reach the boathouse, it is dark and starry yet luminous light reflects from the surface of Diablo Lake. At that moment students begin shouting, “Bats overhead!” Alerted to look up, we see bats hawking insects around the boathouse lights. Unexpectedly during this natural opening in our conversation, Anthony, who has been a bit quiet for a young boy about to head out on an
adventure, suddenly interjects, “If we see a bear, we will all run, right?” (conversational interview, day one, September 17, 2008).

I know Anthony and Nick are preoccupied with bears but I had been unaware of Anthony’s present concern until now. I wonder how many other students share his concern. I reassure them that bears are shy around big groups of people. As we talk about bears, Ava becomes interested in bear behavior too but she is more interested in the bats overhead than a bear in the woods. I notice that Anthony remains close by my side.

At the dam, everyone becomes intrigued by the strong and steady warm wind blowing up the concrete dam from the canyon below. Students also shout, “Hello,” playing with their echo down the canyon. Even Anthony begins to play in the night wilderness, shouting into the black canyon.

During the walk back to the lodges, under a starry night sky, the children seem more relaxed. We move more confidently through the darkness as our eyes accommodate to the night skies. Anthony begins to range more freely from my side as he walks with a friend. The voices are more subdued as deep silence fills the voids in conversations. Listening replaces talking as the preferred activity. Footfall softens. Someone hears an owl. The bats are still flying overhead. A shooting star sends awe through those lucky to see it. The Milky Way glows.

We pause at the Sourdough Creek Bridge to listen to the subterranean water trickling through the rocks as it enters the lake. A heron “croaks” in the distance. Students slip through the darkness, ready for sleep after a busy day in nature. I silently speculate that for most students, this authentic night experience in nature will remain a significant memory long after my Post-Program interviews in a month.
Vignette 6: Biotic Day

It is Biotic Day, and the guiding question for today, “How are the living parts of the North Cascades Ecosystem interconnected?” (See Figure 4.3. Biotic Day Themes, Topics and Guiding Questions). In preparation for a 7-hour day on the trails above the Learning Center, students pack carefully and meet at the amphitheater. To insure that everyone experiences the remoteness and intimacy of the wilderness, our trail leaders have carefully scheduled activities so that the three trail groups will remain spread across the landscape. They carry field radios, first aid supplies for emergencies and are Wilderness First Responder certified.

One group starts their day exploring the miniature world of nature at the Microscope Lab. Another group heads down the Sourdough Trail to explore forest food chains, and the final group begins investigating native plants at the Lily Shelter (Photographs of these sites are included in Appendix C). Initially, I join the Black Bears. It is sunny but still cool. A raven calls from the rooftop of the Microscope Lab drawing the children to stop and “talk raven.” Several children imitate the guttural croak followed by a hollow knocking sound. They tentatively interpret raven language, “Qua, qua-knock, knock,” to mean, “Hello, good morning!” Everyone has an answer to Bonny’s question, “What is the raven doing when it is vocalizing?”

See it’s bobbing its head up and down talking and another raven is listening and watching for fun. (Maria, researcher field notes, day two, September 18, 2008)
**DAY 2 THEME: BIOTIC**

**Overall Guiding Question**
How are the living parts of the North Cascades Ecosystem interconnected?

**Topics and Guiding Questions**

- **Forest Food Chain**
  - *What is food for plants?*
  - *How does energy flow through an ecosystem?*
  - *What are the roles of producers, consumers, and decomposers in an ecosystem?*

- **Each One Teach One**
  - *Can you describe a native plant in the North Cascades Ecosystem?*

- **Investigating Animals in the North Cascades Ecosystem**
  - *How is observation and inference used by scientists to study animals like forest carnivores?*

- **Microscope Lab**
  - *How can you use a microscope to experience the natural world?*

- **Web of Life (Can be integrated into any or all days of Mountain Explorations)**
  - *How does disturbance affect the interactions among the living organisms in a North Cascades ecosystem food web?*

- **How Does Your Garbage Grow?**
  - *What is your Foodshed?*
  - *Where Does your Garbage Go?*

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I notice that it is easy for children to anthropomorphize bird behaviors. As we shift to the day’s Biotic theme, Bonny leads another Food Chain Game that reinforces the components of the forest food chain: producers, consumers and decomposers.

Bonny redirects our attention by instructing us to find one natural object, a producer, consumer or decomposer “that you want to see in a new way.” Children scurry about looking for a small natural object to bring to the Microscope Lab. Entering the lab
we see ten microscopes already set up on tables. After a short “how to focus your microscope” lesson, students explore their found objects. To encourage connections between the roles of producers, consumers and decomposers in an ecosystem, Bonny asks, “Who brought a producer?” Several students raise their hands with maple leaves and fir needles. The magnification offers a new perspective on common natural objects. Each student has a favorite microscopic image. “I liked the feather-like hair! “I like the rock-like crystal.” “The seeds look like tiny see-through insects.” “The pinecone has sap like syrup.”

I begin to wonder whether this is biophilia emerging and I draw closer to share the images. As students remain absorbed in experiencing their microscopic worlds, Bonny confides to me that one of her goals today is to get children to slow down and watch nature intimately. Therefore, she does not want to hike all the way to the Sourdough Waterfall. Instead, she has planned activities in four unique habitats. I tell her my plan is to rotate between groups.

When Avery steps outside to liberate her lichen-encrusted twig, a butterfly lands on her pink sandals and remains for several minutes. Bonny asks, “How do you feel?” Avery contemplatively responds, “I feel like a flower.” (Avery, researcher field notes, day two, September 18, 2008) Bonny is careful not to identify the butterfly, but rather to ask, “What is the butterfly doing?” As Bonny models inquiry and affiliation with nature, I notice that Maria is tuned to her every word. I realize that the Black Bears are poised to begin a wonderful day of deep observation of nature and new knowledge of the interconnections within an ecosystem.
At each stop along the trail, Maria now uses her hand lens, *Cascade-Olympic Natural History: A Trailside Reference* (1988) and journal. Other students commence to make observations of their own. Maria begins to walk with her field guide open for ready access. Alternately observing, then reading, she proceeds at a naturalist’s pace. I walk with her at the back of the line. Maria informs me quite perfunctorily, “That’s Witches Hair, and it’s a type of lichen.” The sun is streaming into the forest, lighting the understory.

Michael finds squirrel remains; a skull, lower mandible, tail and fur that suggests scavenging or predation. Speculations abound. Children are naming the predators that they know: owl, bear, cougar, raccoon and wolverine. Modeling close observation techniques with her hand lens, Bonny edges down the trail looking intimately at the ground along the trail but not disturbing the greenery. As animal trackers we head down the trail looking for more *animal signs*. I am struck by the thorough observations that the Black Bears are making as they move down the trail. A few clipped feathers are found on a log and that draws everyone back together. All the artifacts are left in place for other groups to discover as Bonny leads us in another round of the Food Chain Game to reinforce the roles of producers, consumers and decomposers.

We learn the Fox Trot from Bonny. Feeling our way with our gum feet, we wiggle and spread your toes. We try out our “owl” eyes, blurring and focusing. Our pace hastens as we skitter up the trail in pursuit of Bonny. Slowing our pace, Bonny silently points to objects along the trail. Before we realize it, we have arrived at the Deer Creek Shelter. Bonny asks, “How do you feel?”

Energized, like I want to put my feet in the water. (Maria, researcher field notes, day two, September 18, 2008)
Relaxed and tired. (Avery, researcher field notes, day two, September 18, 2008)

I like the hiking; the moss feels like carpet. (Nick, researcher field notes, day two, September 18, 2008)

Bonny asks, “What did you see?” Each child is given a chance to respond:

I saw a snail thing. (Kenya, researcher field notes, day two, September 18, 2008)

I saw a creek and I can still hear it! (Michael, researcher field notes, day two, September 18, 2008)

I saw a stream and a fox den. (Kira, researcher field notes, day two, September 18, 2008)

I noticed the back of a fern. (Kenya, researcher field notes, day two, September 18, 2008)

I liked the funnel-shaped fungus (Angelina, researcher field notes, day two, September 18, 2008)

I heard squirrels. (Avery, researcher field notes, day two, September 18, 2008)

Green filtered light penetrates the open cedar lattice of the shelter as the Black Bears read out loud a legend describing the birth of Puget Sound and the Cascades Mountain Range by Salish Elder Charles Pickering. In the legend, the Great Spirit rewards the coastal people with Cloud and Rain and punishes the inland people for their greed by scooping soil from the dry ocean bed to build the North Cascade Mountain Range. The mountains trap all the moisture as snow and rain. The hole left fills with water from the mountain streams and rivers and is now know as Puget Sound. The legend concludes by explaining the rain shadow effect of the Cascade Mountains – why people enjoy abundant rain only on the coast side of the mountains and people on the east side have only dryness. Bonny asks, “Who has been on the dry east side?” Avery, now feeling more comfortable in the group, volunteers, “We’re not that rich, so I’ve only been on this
wet side of the Mountains” (Avery, researcher field notes, day two, September 18, 2008).
I reflect how difficult it is to teach children about the rain shadow effect when they have not yet experienced the drying effect of mountains. Children are still talking about the legend as we eat our trail snacks on bandana napkins, carefully collecting all crumbs. Kenya is telling Avery how dry it is on the east side of the mountains, “like a desert in places compared to here” (Kenya, researcher field notes, day two, September 18, 2008). I wonder if other children are making connections between rainfall abundance and plant life.

As we get ready to depart, suddenly Maria spots a bird’s nest on the beam above her head. Describing it as a muddy, grass cup, she looks to me to identify it. There is no adult bird present so I delicately reach up and probe the nest for eggs. Extracting an old broken eggshell, I hand it to Maria who eagerly describes the color of the half shell as “robin egg blue.” Maria suspects that it is a robin’s nest.

By demonstrating with my unfolding hands, I show that when a hatchling emerges from its egg, the shell breaks outward not inward. Maria asks, “Why is this shell broken inward?” I try to leave the mystery open ended, “I don’t know for sure, but when another animal eats or consumes an egg, it breaks inward.” Maria says that her mom told her that jays eat robin eggs. I replace the broken eggshell in the nest. Wandering up the trail, I wonder how many children have thought of predators as consumers before Mountain Explorations.

Facing us on the trail, Bonny enthusiastically introduces the next activity saying, “I love Each One Teach One. In this activity, you will teach each other about one native plant along this trail connecting it to the forest ecosystem.” She explains the activity to
the Black Bears and walks up the trail to the first plant station. Sitting in a quiet circle, children reflect and write in their journals as they wait for the chaperones to release them one-by-one down the trail. A Winter Wren is singing. Maple leaves sprinkle the trail. No one is talking. Getting ready to go up the trail, Koby is packing his sit pad and water bottle. The trail slopes gently upward and we watch Koby disappear into the fabric of the green forest. When it is my turn, I stop at each station. Listening to the children share their plant knowledge is informative and I take notes as they build connections to the plant community. I reach Koby’s station last and he proudly tells me about his forest plant, the vine maple. He runs his hand along the smooth bark making connections between vine maple’s green bark and stems and the low light of the understory habitat. Soon, the rest of the group joins us. The children are eager to recap the experience, exclaiming, “Teaching along the trail is fun!” (conversational interview, day two, September 18, 2008)

Maria is quite attentive to Bonny’s instructions, and as we reach Fawn Creek Shelter, she quickly has her hand lens, field guide and journal ready to go. She is the first to raise her hand to read aloud and already has her Mountain Explorations journal open to page 25, Searching For Animal Signs. It is quiet as the Cougars silently read along. Extracting a big bag of replica rubber tracks from her pack, Bonny gives one track to each pair of children. Working collaboratively, we try to identify our mystery tracks by making observations, measurements and comparisons. Books, journals and rulers are vital tools as children are absorbed in the challenge. Bonny is intentional, “Now, we will confirm our prediction with a field guide to mammals and tracks.” Focusing intently,
everyone is eager to develop their systematic investigation skills using the field guides to validate their predictions.

As we conclude the lesson and begin to pack, everyone hears a bleating sound from the woods behind the open-air shelter. I silently wonder if it is the wind in the trees, or perhaps an animal. There it is again, a distinct bleating, everyone hears it. Bonny looks at me questioningly and I affirm with my upward glance and nod. She calmly tells the group that, “We need to make a little noise because it is best not to surprise a momma black bear and her cub.” Bonny starts talking rather loudly, “HI BEAR, WE’RE HERE, GO AWAY BEAR.” Gathering our journals and packs we sing a rousing camp song as we retreat toward the Lily Shelter. Children are looking hard into the forest – suddenly looking for bears is important work.

As we finish our Searching for Animal Signs lesson, children are reflecting as they contemplate animals and humans living together in the wilderness:

You don’t want a bear to get along with humans because then you’d have to put it to sleep. (Ethan, conversational interview, day two, September 18, 2008)

I am looking forward to tracking the meaning that children derive from our bear story. I wonder what connections children will make as the exciting bear story is told and retold.

That night, leaving the dining hall, I notice that children are smiling after a vibrant day on the trails. A few children run up the long stairs to the labs but most are walking and talking with friends. Sitting on the black slate floor of the Terrestrial Lab, groups of children are sharing stories from their day in the field. Full of energy, Park Ranger Kari, shows us a skull of a cougar and announces, “Tonight we will investigate predators of the North Cascades ecosystem.” The children’s excitement is tangible as they point curiously toward a dozen animal skulls that are carefully arranged on three tables.
After a preliminary introduction to North Cascade herbivores and carnivores by Ranger Kari, children collaboratively examine the life-sized animal skulls. Picking up a skull, Hannah articulates the lower jaw of a raccoon. Demonstrating her thinking out loud she explains:

Oh cool, look, these 2 pieces go together. Raccoons eat garbage this way. (She opens and closes the jaws) (Hannah, researcher field notes, day two, September 18, 2008)

Examining the cougar skull, children sweep their fingers over the eye sockets and long canine teeth, making connections between the cougar’s anatomy and predatory behaviors, “What big eyes, they must see everything in the forest!”

The bear’s skull is receiving a lot of attention and I move closer to listen to the children’s talk. Maria is telling her peers that she thinks she saw a bear last night on the night hike. With rapt attention, Anthony and Koby begin asking Maria for more details of the bear sighting. Holding the bear skull, Maria changes her story, “At least it was a dark moving shadow.” Maria playfully closes the bear jaw toward Anthony’s hand and he smiles saying, “Look out. That’s a predator with canine teeth, they can bite hard.”

It is getting late. Children sit back on the floor and Ranger Kari is encouraging children to examine their own knowledge and feelings about predators in the wilderness. She asks, “What have you learned and what questions remain? How do you feel about sharing the wilderness with predators?” It is after 7pm, and many of the children are leaning back against their hands for support. Two students, Anthony and Koby, have questions about bears, “Is it true that bears can really run faster up a hill than down?” “How fast can bears run?”
Kari answers their questions referring back to park research and bear anatomy. Kari’s second question about sharing the wilderness with predators remains unexplored as children join their chaperones and head back to Lilly Shelter for a campfire, skits and songs.

Arranged on sit-pads in sweeping half circles around the fire pit, the children are singing songs that have become familiar over the last two days, *The Moose* and *The Roots Go Down to the Ground*. Bonny says, “Now let’s make some new verses for the *Roots* song making interconnections between parts of the forest ecosystem.” Children are singing their new verses and everyone is repeating the chorus:

I’m a salal growing along Deer Creek.
I’m an owl calling in the forest.
I’m a bat catching insects.
(researcher field notes, day two, September 18, 2008)

Stars are hidden behind clouds. There is slight breeze through the valley, noticeable as children pull on hats and gloves. Flashlights are turned off and the firelight softens the darkness. The first skit titled, *Why Bears Like Honey* features Maria as the Bear. The narrator reads her script with a headlamp while her lodge group plays a variety of interconnected forest creatures, a chipmunk, bees and a Douglas fir tree. Children laugh at the hilarious antics of their peers as they act out the interconnections of the forest ecosystem. As we sing one more song, the waning fire is extinguished. We head to our lodges for sleep.

**Vignette 7: Community and Reflection Day**

It is Day Three, our final day at Mountain Explorations and the focus is Community and Reflections (see Figure 4.4). Children are up early to pack and clean
their rooms. The theme of the final day is two-fold: (1) how do we fit into the North Cascades Ecosystem; and (2) how do we connect the lessons learned at Mountain Explorations to our homes?

After breakfast, I join some children at the amphitheater. While we wait for the trail leaders, I ask a few kids about their favorite experiences at Mountain Explorations. They excitedly talk about what has been special for them.

I saw a mushroom with a maggot. Hikes. Mountains. Taking pictures. (Avery, conversational interview, day two, September 18, 2008)

I like putting my head in the creek under the waterfall. We were so high in the mountains, the sun was almost under us. (Ethan, conversational interview, day two, September 18, 2008)

The camouflage game is my favorite. (Jarrod, conversational interview, day two, September 18, 2008)

I tell them that one of my favorite solitary activities is the *Silent Hike*. They already know about this special hike from their trail leaders and are looking forward to their Silent Hike this morning.

Joining the Black-tailed Deer trail group, we leave the amphitheater and hike up the Deer Creek Trail. Children are already observing and naming the native plants and wildlife along the trail. Responding to Ranger Tom’s encouragement, they continue reviewing the forest plant community. I notice that children are smiling and eagerly sharing their new knowledge of native plant communities. I listen to children’s rich stories of aboriginal plant uses, wildlife associations and descriptions of plant’s ranges.
### Day 3 Theme: Community and Reflection

#### Overall Guiding Questions
- How do we fit into the North Cascades Ecosystem?
- How do we connect the lessons learned at Mountain Explorations to our homes?

#### Topics and Guiding Questions

##### Silent Hike
- *How can your experience in Nature be safe and exciting?*
- *How can you slow down and observe nature?*

##### Bringing it Back Home Map Exercise
- *How are Mountain Explorations and the students’ community similar?*
- *What connections exist between these Mountain Explorations and your home community?*
- *How can you share your new knowledge of the North Cascades Ecosystem with friends and family at parks in your own community?*

##### Postcards
- *As you reflect on your Mountain Explorations experience, what would you write to yourself?*

##### Nature Writing
- *How can you use creative writing as a way to express your feelings about the environment and illustrate what you have learned?*

##### Closing Circle
- *What do you want to share with students, chaperones, teachers, and instructors about your time at Mountain Explorations?*

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Ranger Tom asks, “How will you share your new understanding of the North Cascade Mountains?” Alex says he is looking forward to taking his family on a nature trail to do *Each One Teach One* when he gets back home. Jacob and his parents, who are both chaperones, say they want to come back with their entire family. Olivia says she has “loads of pictures” to share. Madison will tell stories of the mountains to her grandmother.
Pausing at the Deer Creek Bridge we listen. Deer Creek is gently flowing beneath us, clouds are blowing overhead and a light breeze is rustling the maple leaves. Ranger Tom asks, “Can you think of any connections between Mountain Explorations and your home community?” Actively brainstorming, the children think of many connections and make a list in their journals: the Skagit River flowing down to the ocean, animals and humans moving up and down the mountains, the air we breathe, weather, storms and habitats connect places.

Our Silent Hike starts at the trail junction above the Deer Creek Shelter. The setting is subtle yet stunning. Lit with green reflections, the trail follows the slowly winding stream that is sheltered under a partially closed canopy of vine maples, big-leafed maples, Douglas firs and red cedars. Patches of yellow sunlight illuminate the understory greenery in changing kaleidoscope patterns.

Modeling the easy-going pace, Ranger Tom ambles slowly down the path ahead of us. He leaves a series of laminated note cards in the trail for us to discover, read and leave for the next hiker. Our chaperone, Jacob’s father, releases one child every three minutes. Each child slowly walks the trail, pausing to read the cards and reflect. Visually and auditorially alone, each child spends 15 minutes in reflection along the trail. Lined with salal and Oregon grape, the trail gently slopes upward. Jacob is the second to last to depart, smiling and confident he slowly climbs into the green and disappears behind an old growth fir. When it is my turn I move thoughtfully up the trail pausing every 100 meters to read a card. I document each card in my field notebook.

*What if it never rained?*
*How would this area look to a raven?*
*Point to something you can identify.*
*Take a deep breath.*
A winter wren sings its endless series of rapid musical trills and chatters from the bank of Deer Creek. I am struck by the brilliant radiance of the lit patches of green. I reach the other children in fifteen minutes of slow walking.

I see that Ranger Tom has provided each child a large blank postcard and a few colored pencils. Everyone is silent, spaced comfortably along the trail, writing their reflective post cards addressed to, *Dear Me*. Everyone is capturing a few favorite memories as drawings and words; they know that later in the winter, Ranger Tom will deliver the postcards back to them at school. Madison draws small caricatures of a tree, her Lodge, the Skagit River, Twin Peaks and a Douglas’ squirrel. Alexa draws herself on the silent hike “because it was relaxing and fun.” Jacob draws a bird on a lodgepole pine. Jesse writes to remind himself that a mother black bear “will send her cubs up a tree and she will just stay, sitting on the ground until the danger is gone.” Hunter draws an intricate orb-like spider web and thanks himself for a cool trip. Spring provides herself a laundry list of nature experiences that range from learning about glaciers to playing games. Olivia draws her favorite activities, taking pictures and eating strands of salal berries. Jesse finishes his drawing and lays back to watch the layered leaves waving softly.

We all sit quietly. As a naturalist, I cannot ignore the animal and other sounds. Occasionally, a nuthatch, squirrel, robin or Varied Thrush calls. Someone coughs once, a zipper closes, clothes rustle gently but no one talks for 40 minutes of wonderful peace.
When Ranger Tom tells us it is time to go, everyone resists quietly, not by talking but by packing up slowly. Ranger Tom reminds us that we will each have an opportunity to share our *Unselfish Wish* with the entire class at the closing campfire back at the Lily Shelter. Kenya asks a clarifying question, “You mean a wish for the earth?” Ranger Tom adds, “Unselfish means something generous, that shows your concern for more than yourself.”

On the final trail toward the Lily Shelter, we spot a striped Northwest garter snake. Warmed by the mid morning sun, it slithers into the salal. Kira tells us that she has never seen a snake outside a zoo.

Approaching Lily Shelter, we smell pine smoke and then see a thread of blue smoke climbing through the trees. The Cougars have already lit a small campfire in the fire pan at Lily Shelter and are softly singing camp songs as they wait for the other two trail groups. We calmly join the Cougars in song. When the Black Bears arrive, everyone stands and forms a big circle around the campfire. One by one, we walk to the center of the circle. Tossing our sprig of fresh cedar needles into the fire, we say our *Unselfish Wish* out loud to the group. Our fire is flickering as the cedar sprigs catch fire. We head toward our bus and home.

**Researcher Reflections**

This glimpse into Mountain Explorations has provided the reader with a sense of what children experience in the three days they spend immersed in the wilderness of the North Cascade Mountains. They investigate ecosystems by studying the abiotic and biotic aspects of local and regional environments. Through lessons that cover topics such as geology, weather, forest ecology, native plants, and food chains children learn more
about the components of the mountain ecosystem. The hands-on labs and field activities provide first-hand knowledge and awareness of the wilderness of the North Cascades. Their familiarity with the interconnected wilderness ecosystem grows as they eat, sleep and travel in the wilderness.

On Biotic Day, children are on the wilderness trails, away from bathrooms, drinking fountains, and classrooms for seven hours. They refine their wilderness etiquette skills as they investigate the biodiversity of the mountains. Games like *Web of Life* show the intricate connections and dependencies between ecosystem members. By making observations of the forest diversity and playing instructional games along the trails children begin to see that food (nutrients and energy) flows through their own bodies as it does in ecosystems. As children begin to understand that the living parts of the North Cascades Ecosystem are interconnected, they also begin to feel their own connection with the wilderness.

On Abiotic Day, children begin their investigation of the nonliving parts of the North Cascades Ecosystem. Children see how water and ice shape the landforms in the rugged mountain ecosystem. They learn how to navigate the wilderness safely to limit their impact on the trails and forest community. Children explore the geology of the North Cascades Mountains as they venture up mountains and investigate rocky shorelines. On the trails and paths of the Learning Center, they experience the changing weather first-hand. The night hike provides a unique experience in nature that can challenge their sense of safety and competence.

The Community Reflections Day provides an opportunity for children to share their feelings in a safe and personal way. While revisiting the forest communities,
children take a *Silent Hike*, create poetry and write reflections in their journals. As children reflect on their experiences in the wilderness, they are encouraged to share their feelings toward the planet and the non-human environment by creating an *Unselfish Wish*. The children’s experiences inspire and inform connections to the earth. Together these experiences encourage a growing sense of biophilia as will be detailed in the analysis of the data presented in the next two chapters.
CHAPTER FIVE
CHILDREN’S PERCEPTIONS OF NATURE
AND EXPRESSIONS OF ENVIRONMENTAL VALUES

This is the first of two chapters that contain the findings of my study of children’s perceptions of nature and biophilia in a residential environmental education program. Chapter Five provides an overview and analysis of 35 children’s responses to nature and documents how their perceptions of nature and associated expressions of environmental values changed through Mountain Exploration experiences in the wilderness setting of North Cascades Mountains. Chapter Five also provides the reader with a foundation for Chapter Six, which offers a detailed examination of three children’s developing perceptions of nature and environmental values and how these reveal an emergent biophilia.

The research findings for Chapter Five are based on my analysis of in-depth interviews and documents collected from two classes of grade 5 students who participated in the Mountain Explorations program in 2008. The analysis was based on my modification of Kellert’s (1996) typology of nine environmental values. This analysis, supplemented by the vignettes presented in Chapter Four, demonstrates how children augmented and extended their environmental values through experiences in a residential environmental education program.

Table 5.1 summarizes my analysis of children’s environmental values. I have organized my discussion of the children’s environmental values into related but not exclusive sets. The scientific-ecological, naturalistic and symbolic set refers to
environmental values that are more cognitive in their expression. The grouping of aesthetic, humanistic and negativistic values considers together those values that tend to be manifest emotionally. Finally, moralistic, utilitarian, and dominionistic values are considered together as these are associated with broad belief orientations that involve the intersection of the cognitive and emotional domains (Kellert, 1996). This table is organized to present the nine environmental values I found to be expressed in children’s interview responses and written work collected from the two classes before, during, and after the Mountain Explorations experience.

In the remainder of this chapter I discuss these finding and will focus on two key points: (1) how children in the Mountain Explorations program expressed a range of the environmental values identified by Kellert; and (2) how children changed and extended their expressions of these environmental values through their participation in the Mountain Explorations program.
Table 5.1 Range of Children’s Expressions of Environmental Values (n=35)

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Children’s Changing Expressions of the Scientific-Ecological, Naturalistic and Symbolic Values of Nature

Scientific-Ecological Value

According to Kellert (1996), the scientific understanding of nature emphasizes morphology and physiology of organisms, while the ecological perspective of nature is represented by an understanding of the interdependence between species and natural habitats. These perspectives on nature can be represented dispassionately as precise observation or systematic analysis and sometimes according to Kellert, contribute to a disposition for control and domination of natural systems. In contrast, these perspectives can also contribute to the integration of aesthetic and emotional responses inspired by appreciation of ecological processes and living diversity.

Prior to attending Mountain Explorations most of the children’s perceptions of nature were based on observations of nature. For instance, when I asked children, “What is nature to you?” they responded with simple objective descriptions of nature that highlighted the presence of plants and animals:

Like animals, like wild animals, like lots and lots of trees and plants and things. (scientific-ecological, observation) (Olivia, Pre-Program interview, September 10, 2008)

I think of living things like plants and animals. (scientific-ecological, observation) (Nick, Pre-Program interview, September 11, 2008)

Before starting the program most children’s responses showed limited ecological understanding as indicated by the absence of interconnections between components of the environment. Two children, however, appeared to have some ecological knowledge. Carmen made rudimentary interconnections between plants and dirt:
Nature is plants and trees and animals and there’s a lot of dirt and stuff [food] for the plants. (scientific-ecological, observation, interconnection) (Carmen, Pre-Program interview, September 9, 2008)

Zach described a basic relationship and interconnection between animals and nature:

Animals live there [in nature] with plants and insects. (scientific-ecological, observation) (Zach, Pre-Program interview, September 11, 2008)

Children’s journal responses indicated that the information provided by the Park Service displays during the first day of Mountain Explorations, contributed to the development of more detailed ecological understandings of the specific organisms in mountain life zones:

At the park Visitor’s Center I learned that black bears like moist forests. Mother bears have two to three cubs in January and February in their den. They eat plants, ants, yellow jackets and termites that they dig in the forest. In the spring bears eat grass in meadows. They peel bark from trees too. (scientific-ecological observation, interconnection) (Ethan, Mountain Explorations journal, day one, September 17, 2008)

Involvement in the program appeared to augment children’s understanding of the interdependence of organisms and natural habitats and foster children’s ecologic and scientific curiosity about nature. This was revealed during their systematic study of animal tracks the second day at Mountain Explorations:

The track looked hairy and we counted five toes with claws. The track has seven different pads. I think it’s a black bear – a carnivore. I then used a ruler to measure its length (9 inches) and width (5 inches). I drew its shape. I concluded a black bear left this track because the track matches the picture in the field guide exactly. I would like to know the weight of the animal, what it eats and also have more books to read about bears in the North Cascade Mountains. (scientific-ecological observation, interconnection) (Kenya, Mountain Explorations journal, day two, September 18, 2008)

After the program was over, children maintained their scientific-ecological understandings developed during Mountain Explorations. However, in Post-Program
interviews and documents where children recalled their experiences, scientific-ecological discussions were abundantly augmented by emotional expressions:

I learned about animal tracks, skulls and diets of predators. Did you know that gray wolves are now rare but their species is coming back again? One thing I love is there is actually a family of gray wolves in North Cascades National Park! (scientific-ecological, observation, interconnection; humanistic, emotional attachment to nature) (Alexa, PTA letter, Post-Program document, September 24, 2008)

It [nature] is beautiful, there are lots of animals to watch and there is a bunch of things to do. I love just being around the trees and seeing all the animals. I figured out there are a lot more trees in the world than I really thought. Everything is so different, a bunch of beautiful colors! (scientific-ecological, observation; humanistic, emotional attachment to nature; aesthetic, beauty of nature, forest, animals) (Nick, Post-Program interview, October 22, 2008)

Overall, my findings show that through experiences at Mountain Explorations, children’s empirical and objective knowledge of the natural world increased noticeably. Growth in scientific knowledge and valuing was augmented by children’s growing awareness of the interconnections within and among organisms in the wilderness ecosystems that they studied. Most significant to this study of biophilia, as children progressed through the Mountain Explorations program, making discoveries and connections to the natural world, their responses to nature became increasingly ecological, emotional and aesthetic.

Naturalistic Value

The naturalistic value, according to Kellert (1997) is revealed through exploration and discovery in nature. For children exploration and discovery are often experienced as play. The Pre-Program data indicated that only a small number of the children in this study had any previous experience exploring nature or had been involved in nature dependent play. Although most children indicated that they liked to play
outside, nature merely served as a backdrop to their recreational activities. While the activities they discussed were likely more enjoyable in nature (such as reading and cycling), only a few activities depended on nature (e.g., hiking, exploring, climbing trees, hide and seek behind trees and bushes and collecting blackberries).

Pre-Program responses indicated that children participated in five types of activities in nature. Nature was a place that 15 out of 35 children had experienced through quiet activities as they read, walked or reflected. Approximately a third of the children reported using nature as a background for traditional ball sports. One child, a snowboarder, viewed nature as a place for extreme sports. Somewhat surprising given the relatively young age of the participants (10 - 11 years old), only five children reported nature as a place for imaginative play; i.e., playing house and building forts. Significantly, only eight children reported that they had participated in nature dependent activities that might promote naturalistic value and biophilic appreciation of nature:

Maybe explore out there and feel what they [animals and plants] feel like and stuff. (naturalistic, explore; humanistic, emotional attachment to nature) (Ava, Pre-Program interview, September 9, 2008)

We like get on our boots and old stuff and we look around for animals. One time I found this cool looking beetle, it was like that big and it was crawling around so I was following it. (naturalistic, exploration; scientific-ecological, observation,) (Carmen, Pre-Program interview, September 9, 2008)

On Day One of Mountain Explorations, children were encouraged to play and explore in the wilderness through games and discovery activities. They learned to walk lightly along the trail like stealthy cougars and foxes. Developing their multisensory awareness of the wilderness, they smelled the fir needles, touched the spongy dark duff and felt the cool air blow through the forested mountains. They took an imaginary mountaineering trip, climbing to the top of Pyramid Peak.
As children made discoveries and awakened to the natural world, their excited exclamations demonstrated a growing interest in the life along the trail. Children spontaneously announced to their trail group, each new sighting. “Wow, look at that white butterfly.” “I have seen these before!” “There’s a chipmunk, I wish I had my camera!” “I see a lot of mushrooms. Can we take them to look in the microscopes?” (researcher field notes, day one, September 17, 2008).

Children’s expressions of naturalistic values increased during Mountain Explorations as indicated by responses representing biophilic play, discovery and exploration in the wilderness. For example, most children (28 out of 35) reported that they enjoyed playing educational games along the trails that involved nature discovery and exploration in the wilderness. Children had favorite games such as “Eagle’s Eyes” which drew attention to the importance of camouflage as a survival strategy, and “Each One Teach One,” which focused on learning to teach about the local plants:

Today, we also played a hide and seek game called Eagle’s Eyes (which is my favorite game). Someone stands in the middle of a field and the other people hide where they can see the head of the person in the field. Then the person in the field looks around without walking anywhere and tries to see the people hiding. (naturalistic, play) (Olivia, Mountain Explorations journal, day two, September 18, 2008)

We did a fun lesson (Each One Teach One) where our leader takes one person at a time and tells them about a plant or tree and they teach the others. Mine was the Douglas fir tree. (naturalistic, play) (Ava, Mountain Explorations journal, day two, September 18, 2008)

As they explored the wilderness trails during Mountain Explorations all children reported memorable discoveries in nature that stimulated growth in their naturalistic values. These discoveries ranged from an intimate encounter with a wildflower or colorful fungus along the trail or discovering bones and feathers representative of
predation to bear tracks in mud and cougar scratch marks on a tree. On days two and three, children were encouraged to reflect on these discoveries and then express them creatively as poems or stories recorded in Mountain Explorations journals. After discovering a sword fern along the trail, Jarrod, first made a labeled drawing of one of the fronds. He then read briefly about ferns in a field guide before writing this poem:

Fern  
green, small  
waving, popping, reproducing  
a small waving feather  
green plant

(naturalistic, play; aesthetic, emotional attachment to nature) (Jarrod, Mountain Explorations journal, day three, September 18, 2008)

After the program was over, children maintained the naturalistic values they developed during Mountain Explorations. In their Post-Program interviews and documents children’s descriptions of nature play and explorations consistently were augmented by emotional expressions:

I got to see a mark from two little cubs climbing a tree and marks from a cougar on a tree. It was awesome. (naturalistic, exploration; aesthetic, emotional attachment to nature) (Jesse, PTA Letter, Post-Program document, September 24, 2008)

I liked Mountain Explorations. My group, the Cougars, got to see bear tracks and the waterfall! It was the best waterfall I had ever seen in my whole entire life. I loved it! It was the most wonderful falls. Well that’s not the best part; we got to get our hair wet and our clothes! (naturalistic, exploration, aesthetic, emotional attachment to nature; humanistic, emotional attachment to nature) (Haley, PTA Letter, Post-Program document, September 24, 2008)

Mountain Explorations had lots of great views: mountains, glaciers and birds and the bear roaring and everything is so green! (naturalistic, exploration; aesthetic, vista) (Michael, Post-Program interview, October 22, 2008)
These responses illustrate how first-hand, multisensory experiences in the wilderness during Mountain Explorations allowed children to develop and deepen their relationships with nature. Educational activities that allowed children to explore, play and reflect in nature contributed to children’s developing naturalistic values. These activities appeared to have enduring qualities. This fact was evidenced by the children’s emotive and aesthetic descriptions of the play and discovery activities they had experienced. Their words also provide further support for how their biophilic expressions diversified and deepened during Mountain Explorations.

Symbolic Value

According to Kellert (1996) symbolic value is evident when nature or nature experience provides the inspiration for written or spoken expressions of cognitive biophilia. Such expressions may be communicated through story, myth, poetry, and dream sharing. Initially children’s responses to nature were simple descriptions. For example, on Day One, after learning and practicing the silent hiking technique called the Fox Trot, each child was asked by their instructor, “What was the coolest thing that you saw while walking silently along the trail like a fox with silent gum feet and owl eyes?” Children’s abbreviated spoken responses recorded in my field notebook, read like an itemized laundry list, “A creek, a stream, a fox den, ferns, moss, and a snail thing” (scientific-ecological, observation) (conversational interview, day one, September 17, 2008). These early program responses lacked poetic description, feeling and emotion.

As children experienced the wilderness and built an ecological perspective of the North Cascades, their spoken responses increasingly blended descriptions and
observations of nature with emotional and aesthetic expressions. For example, on the
morning of Day Two, after the night hike to the dam, I asked children to share their
favorite nature sightings with me. Children were eager to tell their stories of the night
hike:

Walking to the dam last night was great! I held hands with my two best friends. Being close to the trees along the trail made me feel good too and I liked the happy frog sounds in the forest. The bats looked cool catching mosquitoes. Looking over the dam at night was way awesome! My favorite part was listening to Sourdough Creek babbling under the boulders by the lake. (symbolic, story, anthropomorphism; aesthetic, beauty of nature; scientific-ecological, observation) (Maria, conversational interview, day two, September 18, 2008)

Nature provided children with a rich source for creating biophilic expressions
laden with metaphors and anthropomorphic imagery. For example, before their
Microscope Lab on the morning of the second day of Mountain Explorations, children
were invited to find one special natural artifact that they wanted to investigate under
magnification. Observing nature intimately under the stereomicroscope led to poetic
written descriptions of the natural world:

The orange dots on a sword fern look like very fancy beautiful beads. (scientific-ecological, observation; symbolic, poetry; aesthetic, beauty of nature) (Maria, microscope activity, Mountain Explorations journal, day two, September 18, 2008)

The sap from the tree on the pinecone looks like gorgeous tiny crystals. (scientific-ecological, observation; symbolic, poetry aesthetic, beauty of nature) (Kenya, microscope activity, Mountain Explorations journal, day two, September 18, 2008)

Later during the same day, all children received instruction in writing poetry,
specifically, emphasizing powerful word choice. They were encouraged to think about a
meaningful aspect of the natural world and build a rich description of their experience in
the wilderness that captured their feelings in words. Children were prompted to use
specific, interesting and descriptive language that would allow their reader to “jump” into the experience through words. This led to vivid and captivating poetry about animals and nature.

Time for contemplation was a key program element that seemed to play a role in children’s understanding the symbolic value of nature. Throughout Mountain Explorations, children were allowed time to sit quietly in nature. From the Sourdough Falls lookout, they enjoyed a promontory view of the sharply glaciated mountains. Along the forested trails, they nestled deep in shaded evergreen salal and Oregon grape, contemplating forest plants and animals. They rested on the elegant wooden bridge overlooking the rushing Deer Creek and felt the bracing lake wind blow through their hair. At each wilderness location children were encouraged to reflect on and transform their experiences and observations in the mountains into poetry and story. The following two responses written on day two and day three of Mountain Explorations, began with children first engaging through direct observations of nature, then reflecting and finally transforming the experience into poetry:

Glacier
icy, slippery
melting, growing, cracking.
A dirty snow - ball
Icy slippers

(scientific-ecological, observation; symbolic, poetry)
(Hannah, creative writing, Mountain Explorations journal, day two, September 18, 2008)

Everything is green
sparkling in the sunlight
the animal runs.

(scientific-ecological, observation; symbolic, poetry; aesthetic; beauty of nature)
(Winter, creative writing, Mountain Explorations journal, day three, September 19, 2008)
Kellert (1997) suggests that symbolic valuing of nature is revealed when people use natural images to represent biophilic feelings and thoughts. I found that animals often catalyzed children’s symbolic expressions. For example, in the afternoon of Day Two, after hearing what he thought was a bear cub ‘bleating and mewing’ in the forest near the Deer Creek Shelter, Michael was inspired to write a poem. After quickly moving to a new location far from the bear sounds, Michael’s trail group settled into the green understory near the Lily Shelter. In this quiet reflective space, Michael interpreted his observations and feelings about the exciting bear cub encounter by writing a poem in his Mountain Explorations journal:

Black
soft, furry
lying, crying, roaring.
Really scared Black cub
Mammal.

*(scientific-ecological* observation; *symbolic, anthropomorphism/story/poetry)*

(Michael, creative writing, Mountain Explorations journal, day two, September 18, 2008)

After the program, children continued to think and write about nature through a poetic lens:

I dreamed
I was a Pika,
in the snow
burrowing with my pals.

*(symbolic, anthropomorphism/fantasy/dream/poetry)* (Haley, PTA Letter, Post-Program document, September 24, 2008)

Hiking
fun, interesting
walking, drinking, running
I like to hike
nature trails.
(symbolic, poetry) (Koby, creative writing, Mountain Explorations journal, Post-Program, September 24, 2008)

Taken together, children’s responses to nature before, during and after Mountain Explorations program illustrate that children were inspired by their experiences at Mountain Explorations. Empirical observations and ecological interconnections blended with aesthetic feelings gleaned through naturalistic discovery to create novel biophilic communication, thought, and expression. The rich symbolic values expressed by children through their poetry and story were influenced by their sensory-rich experiences at Mountain Explorations. This finding supports Gurevitz’s (2000) claim that affective approaches to environmental education, that emphasize emotional/experiential knowledge over scientific or cognitive knowledge, help change children’s perceptions and values of nature.
Children’s Changing Expressions of the Aesthetic, Humanistic and Negativistic Values of Nature

The clustering of aesthetic, humanistic and negativistic values considers together values that tend to be expressed emotionally (Kellert, 1996). The mountain landscapes and living diversity of the North Cascades wilderness had a tremendous emotional and aesthetic impact on children during Mountain Explorations. Every child in this study expressed positive and sympathetic feelings toward selective aspects of nature; but some also demonstrated negative responses. These negative feelings such as fear and aversion are an important part of our affiliation with the natural world. My findings suggest that negativistic views of nature can be diminished by participating in positive experiences in the wilderness during environmental education activities.

Aesthetic Values

Children’s responses to nature during Mountain Explorations support Kellert’s (1996) claim that the aesthetic experience often focuses on the appeal of landscapes, colors and animals. Children’s aesthetic experiences in nature often evoke strong emotional responses. From the moment children arrived at the Learning Center, their words and actions suggested that they were drawn into the green diversity of the forest, inspired by the grand mountainous vista’s and delighted by the animals. Even before their arrival in the mountains, children were predisposed to study charismatic animals.

I found that large reclusive animals including charismatic megafauna like bears, cougars, deer and wolves elicited aesthetic, emotional and symbolic responses in children. In preparation for Mountain Explorations, the children had worked in groups to
select animal names for their program learning groups. Through discussion of the physical and aesthetic attributes of animals found on a *North Cascades Animal Checklist*, children purposely selected three charismatic megafauna (i.e., Cougars, Black Bears and Black-tailed Deer) as their trail group identities for Mountain Explorations.

The Cougars, Black Bears and Black-tailed Deer groups then did research at their school library to discover *fascinating scientific details* about their trail group animal. This initial research resulted in simple *factual* accounts of the animals that were recorded in their Mountain Explorations journals: “Black Bears can run 30 miles per hour, grow up to 5 feet long and weigh 200 to 300 pounds” (*scientific-ecological observation*) (Jarrod, Mountain Explorations journal, Pre-Program, September 9, 2008). Later these accounts would help provide language, ideas and a factual basis for their creative writing inspired by experiential activities, first-hand observations and discoveries at Mountain Explorations.

During this study, children did not directly observe large animals around the Learning Center or on the trails. However, various animal signs such as tracks, scat and scratches on trees provided tantalizing evidence of bears, cougars and deer living in the wilderness. Children’s interest in large charismatic animals was maintained on Day Two by several educational activities including Animal Tracks, Forest Food Chains and Creative Writing. Children’s initial research of selected large animals was now augmented through the aesthetic and symbolic lenses of poetry. For example, during the afternoon of Day Two, half of the children wrote imaginative poems about the large animals they had previously studied:
My data suggests that small animals also captivated children at Mountain Explorations. Though children were eager to view large animals in the mountains, I observed that children also enthusiastically attended to small animals like squirrels and colorful forest birds. Unlike large reclusive forest animals, small animals were readily observed in the wilderness. For example, when children arrived at the amphitheater the first day of Mountain Explorations, they were joined by a raucously calling Steller’s Jay that had swooped to center stage. For several minutes all children focused on the jay’s animated behavior. The aesthetic response of a child standing near me in the amphitheater captures the emotional aspect of this event:

See, the jays stabbing the pinecone – there! Now it’s flying to the rocks, see it, over there? Now it’s poking in the dirt like it is hunting for something! Hear it call like it is saying its name, ‘jay, jay?’ It’s a beautiful blue-black color, like it is glowing! (scientific-ecological, observation, naturalistic, discovery; aesthetic, beauty of nature) (researcher field notes, day one, September 17, 2008)

During the morning of the Day Two of the program, many children focused on the aesthetics and athletic qualities of squirrel and chipmunk behaviors. These rodents were common along the heavily forested backcountry trails. Jarrod’s observations of a
squirrel gathering and caching seeds near the Deer Creek bridge inspired a page of observational field notes and an expressive poem:

Squirrel  
Fast, fury  
Running, gliding, jumping.  
A furry, pretty, puffball  
Nut eater  

(scientific-ecological, observation; aesthetic, beauty of nature; symbolic, poetry)  
(Jarrod, creative writing, Mountain Explorations journal, day two, September 18, 2008)

Children’s aesthetic responses also extended to the mountainous landscape. For example, all eight children in the Cougar trail group individually reported that the long climb to the waterfall and the playful submersion experience in the icy cold Sourdough Creek was an aesthetic and emotional highlight of their Mountain Explorations experience:

I haven’t really ever seen a waterfall and I got to actually play in the creek. So, that was really awesome, I loved it. Also, if you listen at night when everyone is silent [night hike] you can hear water rushing through the rocks. It’s so cool! (naturalistic, play; aesthetic, beauty of nature; humanistic, emotional attachment to nature) (Ava, Post-Program interview, October 22, 2008)

Hiking to the Sourdough Waterfall, feeling the mist of the cascade, splashing in Sourdough Creek, and later that night, hearing the subterranean Sourdough Creek gurgle in the rocky debris pile at the lakes edge, made a meaningful impact on children’s concept of a mountain cascade. Through a variety of direct experiences in nature, the cascading creek had become a familiar and known entity. Mountain cascades had become real, accessible, enjoyable and outwardly appreciated by children.

Based on three days of trail experiences at Mountain Explorations, children’s ecological appreciation of the diversity and greenness of their outdoor surroundings inspired expressions of the intrinsic aesthetic value of nature:
I’d say there’s like thick green when you’re walking on a trail – there’s like a kind of like a beautiful curtain on the top of thick green leaves and tons of trees and if you’re really quiet, you could see squirrels and I saw a chipmunk or two and there’s tons and tons of different plants! (scientific-ecological, observation; aesthetic, beauty of nature, animals, forest) (Alexa, Post-Program interview, October 22, 2008)

Nature is birds, trees, bushes, animals and everything green. I think nature is wonderful! (scientific-ecological, observation; aesthetic, beauty of nature) (Maria, Post-Program interview, October 22, 2008)

I could feel the wind against my face. I couldn’t have imagined the beauty of Mountain Explorations. From the dock, the lake, mountains and forest looked so superb! (aesthetic, beauty of nature, vista/scenery) (Jacob, PTA Letter, September 24, 2008)

**Humanistic Values**

I identified the humanistic value when children’s responses indicated strong emotional attachment to or expressed love of the natural environment, a specific animal or place. Kellert views the humanistic value as an expression of the human capacities for attachment, bonding, intimacy and companionship. Prior to attending Mountain Explorations many children in my study (15 of 35) reported that they had a special place such as a tree or bench near their homes where they could go occasionally to be alone. Often described as “favorite” or “wonderful,” these special places were typically in children’s yards and were used for respite, retreat and reflection:

My favorite place is my backyard to read in the shade of my tree and sometimes I climb up into my tree because there is a big space in it where you can just sit down and enjoy the view and there are lots of bugs to watch. (humanistic, emotional attachment to nature, relaxation, reflection) (Madison, Pre-Program interview, September 17, 2008)

Upon arrival at the Learning Center on Day One of Mountain Explorations, children were swept into a whirlwind of group trail activities. Though children were
encouraged to walk slowly, make observations and write in their journals, I observed that everyone was too excited to settle into deep place-based reflection. The novelty of trails, vistas and forest diversity inspired vivid and animated responses. Later that day, during the second half of the Night Hike, children’s animation and excitement gave way to calm reflection in the dark. I noticed children’s emotional connection to nature deepen during the night hike as their experiential responses included the word “love.” Walking close to their friends, they studied bats, watched for ‘shooting stars’ and listened to an underground creek flowing beneath their feet, creating lasting feelings of biophilia:

I loved walking at night with friends. We saw a lot of bats, a planet and a shooting star! When I looked over the side of the dam, it looked like 1000 feet down. Except it was only 400 feet. We even heard an underground creek. It was the most amazing night and a wonderful experience to be outside. (naturalistic, discovery; humanistic, emotional attachment to nature; aesthetic, vista; naturalistic, exploration) (Kenya, PTA Letter September 23, 2008)

I love when I had bats flying over my head, that was just amazing. I loved that! I never knew they lived in the mountains. (naturalistic, discovery; humanistic, emotional attachment to nature) (Carmen, Post-Program interview October 22, 2008)

The excitement, emotion and biophilia expressed in these two positive responses represent a loving embrace of the night hike.

On Day Two, the pace slowed allowing children time to pause and reflect in nature. As children settled into the routine of hiking, doing educational activities along wilderness trails and then reflecting, they augmented their initial scientific-ecological and aesthetic expressions with humanistic responses that indicated a deepening emotional attachment to nature:

Some of the plants you can see every day but in like the woods at Mountain Explorations, some things are so different – I really love the rattlesnake plantain with its seedpods like baby rattles – that was cool, so beautiful! (scientific-ecological, observation; humanistic, emotional attachment to nature, aesthetic,
beauty of nature; symbolic, poetry) (Hannah, trail conversation, day two, September 18, 2008)

This learning cycle of hiking, trail activities and reflecting was repeated again on Day Three. I observed that children anticipated the sequence and settled quickly on their ‘sit pads’ to journal and reflect. Under a green closed canopy of big leaf maples and fir trees, I asked Jacob what he was feeling and he responded:

Everything’s green like the trees and everything’s living like you and it’s not like technology, no robotics or anything, it’s all living! I love animals! I love plants and nature! (aesthetic, beauty of nature, forest, animals; humanistic, emotional attachment to nature) (Jacob, trail conversation, day three, September 19, 2008)

During Mountain Explorations, nature experiences provided the inspiration for biophilic expressions representing a growing bond between children and nature. Children also bonded with each other as well as with nature. Sitting at the Lily Shelter with his trail group, under a spreading vine maple, Michael finished his poem about bears, then reflecting on nature and his own human relationships, he was moved to write a free verse poem describing the love he has for his best friend:

Koby
funny, kind
helping, caring, loving.
Koby is a friend.
Human

(scientific-ecological observation; symbolic poetry; humanistic emotional bonding) (Michael, creative writing, Mountain Explorations journal, day two, September 18, 2008)

Children’s responses show how direct experience in the wilderness can be transformative. Hiking trails, making first-hand observations of animals, discovering animal signs and reflecting deeply in nature can be life changing for children allowing them to discover or renew a strong emotional attachment and love of nature:
I’d say Mountain Explorations is a learning thing, where you can learn about all the life changing things. You can learn about nature and see what it’s really like to be out in nature and connect with it. (humanistic, emotional attachment to nature) (Alexa, Post-Program interview, October 22, 2008)

Because, if you grow up, and you want to be a country boy – you can go out in nature and learn like at Mountain Explorations. Yeah, I like nature now – I wanted to see the bear, but it woke up and walked away. I would love to see a bear because I like seeing animals and bears are big and fast and cool – and the momma bear protects its babies! (humanistic, emotional attachment to nature, respect) (Anthony, Post-Program interview, October 22, 2008)

Negativistic Values

Negativistic value is defined by Kellert (1996) in terms of particular emotional responses such as feelings of fear, aversion and anxiety for nature. About a third of the children in this study initially expressed negative responses to nature such as fear of heights, weather, plants, animals, the dark, getting lost and people or strangers. Involvement in the program fostered qualitative changes in children’s negative feelings toward nature particularly wild animals, heights and the dark. As children’s fears diminished, their biophilic expressions increased.

Children’s Fear of Animals

In Pre-Program interviews, eleven children reported that they were afraid to share the wilderness with large animals like deer, bears and cougars. During Pre-Program interviews, children freely shared their worries about sharing the wilderness with animals:

I’m afraid of being attacked by a bear or cougar. (negativistic, fear of predators) (Jarrod, Pre-Program interview, September 11, 2008)

I’m afraid of having a bad encounter with something like a deer, getting really, really close. (negativistic, fear of animals) (Spring, Pre-Program interview, September 11, 2008)
I’m not allowed on trail behind our house because people say that they’ve seen cougars, and they have seen cougar paws. And, some people are kind of weird there, so I’m not really allowed to go there. (negativistic, fear of predators and people) (Maria, Pre-Program interview, September 9, 2008)

These children’s comments indicate that at the start of Mountain Exploration, they had minimal understanding of the ecology, habits and behaviors of these animals.

During the program, children gained knowledge and respect for animals. They learned about forest animals including small creatures (e.g., squirrels, chipmunks, raccoons and coyotes) and megafauna (e.g., deer, bears and cougars) through a variety of field and lab activities and games. These activities included, Food Web and Eagle’s Eye Games, an Animal Tracks lesson, a Bone Lab, a presentation on predators of the North Cascades and informal instruction along the wilderness trails.

On Day Two, a provocative bear cub encounter became a source of rich and changing narratives that permeated and flavored the entire group’s affiliation with nature. Through rehearsal and elaboration of the bear cub story by the community, children’s individual knowledge of bear ecology grew. They also became less fearful and more respectful of the bears in the wilderness, indicating a growing ethical concern for bears:

You don’t want a bear to get along with humans or eat our food because if it got too friendly then you’d have to put it to sleep. (conversational interview, day two September 18, 2008) (moralistic, ethical concern; humanistic, respect; symbolic, anthropomorphism)

Post-Program interviews indicated children’s initial fear of bears had changed to a healthy respect for black bears in the North Cascade Mountains. Anthony, who was initially very afraid of the out-of-doors, overcame his fear and Spring who was also afraid of wild animals became respectful of predators in the wilderness:

Um, [bears] are not really scary now. Like I’m not really a country boy – like out in the woods – I’m a city boy. So, I wasn’t used to it back then, and I was scared.
But, now I’m not, because I know what to do. When you see a bear, don’t run, act big, make a lot of noise and walk away quietly backwards. (humanistic, respect) (Anthony, Post-Program interview, October 22, 2008)

Yeah, my favorite memory is probably seeing the cougar marks on the tree and the bear marks, that was like scary awesome! Kind of like when you’re going on the Ring of Fire [amusement park ride], it’s scary awesome! (humanistic, respect) (Spring, Post-Program interview, October 22, 2008)

Alexa is very expressive and aware of how her personal experiences with nature during the Mountain Explorations program changed her thinking and feelings about bears in the North Cascades Mountains:

Well, before I went to Mountain Explorations, I was actually a little bit afraid of nature, because of things people say, like bear attacks and everything. But, I heard a bear! I heard it! I saw its tracks! I saw its claw marks! Bears don’t look or seem very harmful now, unless you upset them or scare them in any way. (humanistic, respect) (Alexa, Post-Program interview, October 22, 2008)

Knowledge of nature’s larger predators did not make them any less exciting.

Removing the myths and replacing the mysterious with scientific and ecological knowledge and appropriate ways to behave around wildlife was key to shifting negative feelings toward respect and emotional attachment to nature. For many of the children including Anthony, Spring and Alexa, the authentic and emotionally rich experiences in the wilderness that included hiking at night, discovering bear and cougar sign along the trail and studying predator tracks and skulls, helped shift feelings from fear to knowledgeable respect.

Children’s interest in bears and cougars remained strong throughout Mountain Explorations and beyond. The trail leaders modeled for the children, a respectful relationship with all animals including large charismatic predators like bears. Children’s knowledge and understanding of the natural history, ecological roles and behaviors of
predators in the North Cascade Mountains grew. Through these experiences children
adopted a caring, respectful and informed attitude toward predators:

My favorite memory is when my group heard a bear noise and then we had finish
our Track Lesson somewhere else because our leader told us that we had to give
the bear its space. (humanistic, respect, moralistic, ethical concern) (Koby, PTA
Letter, Post-Program, September 24, 2008)

Through their participation in Mountain Explorations first-hand experiences with nature,
children’s initial expressions of fear and concerns about the threats of predators softened,
and their humanistic value of respect grew in intensity as did their moralistic values of
ethical treatment and care for predators.

Children’s Fear of Heights

Another area in which children expressed negativistic value was in relation to fear
of heights. Based on their experiences on the wilderness trails, children’s expressions of
concern in relation to heights diminished during Mountain Explorations. In Pre-Program
interviews, six children without experience in the mountains openly expressed their fear
of heights associated with an imagined steep and threatening mountainous terrain at the
Cascadia Learning Center in the North Cascade Mountains:

I’m afraid of falling off a cliff! (negativistic, fear of heights) (Anthony, Pre-
Program interview, September 10, 2008)

I’m mostly nervous about falling down a cliff or something like that, because
when I’m close to an edge I am scared! (negativistic, fear of heights) (Carlos,
Pre-Program interview, September 11, 2008)

During the program, children gained respect for mountainous terrain as they
played, learned and hiked the wilderness trails of the North Cascades. Their hikes
included a steep climb to the Sourdough Waterfall, a Night Hike to the dam, Each One
Teach One, the Peninsula Trail and a reflective solo hike. During the program, children
commented on how the North Cascade Mountains were steep but more accessible than previously imagined. Children’s *negativistic* views changed to more *humanistic* values of informed *respect* for the mountainous terrain:

I would say that it’s pretty safe in nature on the trails if you know what you’re doing. (*humanistic, respect*) (Jacob, Post-Program interview, October 22, 2008)

The drop off side of the dam is so scary, when you look down, there is a little cascade on the side. It is just so beautiful. (*negativistic, fear of heights, observation; aesthetic, vista*) (Alexa, PTA Letter, September 24, 2008)

I like hiking in the mountains but that one hike to the waterfall – that hike was so long! Yeah, we were walking up hill. We had to climb rocks! Awesome! (*humanistic, respect*) (Haley, Post-Program interview, September 28, 2008)

Like the rest of the Cougar trail group, Carlos reported during Post-Program interviews that his favorite hike during Mountain Explorations was the steep and long trail to Sourdough Waterfall. To reach the rock overlook, his trail group learned that they could safely clamber over rocks, cross a snow patch and climb steep exposed slab stairs made of stones. The inherent challenge in the long trail to the overlook led to strong feelings of accomplishment. After surmounting the final stairs, children were rewarded with the discovery of magnificent views of the valley below. They played in a refreshingly cold creek, ate a hearty lunch and enjoyed quiet reflective activities such as Nature Writing. Children’s *negativistic* feelings for nature expressed in their fear of heights was balanced and mediated by more *aesthetic* and *emotional* values spawned by the impressive vistas and scenery:

My most favorite part was when we went up to this place called the Rock. It has this beautiful Cascade. It’s just beautiful. If you look right over the rocks you can see a beautiful waterfall and it’s a great view. I needed to wet my hair just to cool myself off. I just dunked my head in the water. (*scientific-ecological, observation; aesthetic, vista/scenery*) (Carlos, Post-Program interview, October 22, 2008)
As indicated in Post-Program interviews, many children espoused a positive emotional response to the solo, dam and waterfall hikes. Though challenging to the children, these successful hikes allowed children to grow in confidence as they learned to navigate the mountainous terrain.

During Mountain Explorations, children’s initial barriers to biophilia decreased (e.g., negativistic values of fear of heights and predators), while biophilic values for the beauty and accessibility of mountainous terrain and animals grew (e.g., humanistic, aesthetic and naturalistic values of informed respect, appeal and discovery). Anthony’s response to the wilderness illustrates this shift in values:

I learned how to hike by myself and it seems like it is scary but it’s not. If you are afraid, try not being afraid. What’s to be afraid of? It is just the wilderness. Nothing is going to eat you. Just be quiet and listen. What do you hear? Look around, what’s around you? Do you see any bears? (humanistic; respect; aesthetic, animals; scientific-ecological, observation) (Anthony, PTA letter, Post-Program document, September 23, 2008)

**Children’s Changing Expressions of the Moralistic Values of Nature**

The remaining three values, moralistic, utilitarian, and dominionistic are associated with broad belief orientations that often involve a combination of aesthetic, emotional and cognitive perspectives (Kellert, 1996). While children in this study expressed awareness of a dominionistic value (mastery and control of nature), they did not express an inclination to dominate or suppress nature directly either before or after their wilderness experience. Similarly, my study revealed little change in utilitarian values. In contrast, moralistic values (ethical concern for nature) show substantial growth and are well supported.
According to Kellert (1996) utilitarian values emphasize the many ways that humans gain practical and material benefit from nature, while moralistic values are associated with ethical concern for nature. In contrast to the practical and material exploitation of nature, the Mountain Explorations program emphasizes a strong “leave no trace” philosophy based in a concern for natural diversity of the National Park.

Children’s Pre-Program responses indicated that only a few children (5 out of 35) had ever gathered food from the biologically rich land found in the Northwest through seasonal fishing, clamming, crabbing and foraging for berries:

I like to gather blackberries at my grandparents farm in the fall. **(utilitarian, hunter/gatherer)** (Hannah, Pre-Program interview September 12, 2008)

Because the material use of nature was deemphasized at Mountain Explorations, children’s utilitarian expressions were largely unaffected by experiences in the wilderness. Children did not fish in the lake or forage for berries. Their food came from the dining hall not the immediate land around the Learning Center.

Most children’s Pre-Program responses indicated a rudimentary understanding that destruction of living plants like trees affected nature:

I affect nature negatively by breaking limbs. **(moralistic, concern)** (Luis, Mountain Explorations journal, Pre-Program, September 9, 2008)

I affect nature by cutting down trees. **(moralistic, concern)** (Nick, Mountain Explorations journal, Pre-Program, September 9, 2008)

As stated previously in this section, many children expressed concern for nature. Liam showed particular sensitivity to reducing his impact or domination of nature by cutting his consumption of toys and electricity:

There are definitely some problems in the world that I’d like to fix personally but there’s just not much I can do about them. Like cutting energy and stuff, I’m not even sure we need the lights up there but we have them on anyways. Some of the
things I’d like to change, I try to be sustainable by not buying bad toys at my birthday. I just buy toys that I know I’m going to like and last like a long time. My family uses fluorescent bulbs and that saves - I don’t know, the equivalent of taking 5 light bulbs out of service. And, we try to limit our trash output. (moralistic, concern) (Liam, Pre-Program interview, September 12, 2008)

Starting on Day One, all children attending Mountain Explorations received implicit instruction in the “leave no trace” principles that provided clear behavior expectations for children visiting the National Park. For instance, National Park Service policy mandates that visitors to the wilderness leave rocks, plants and other natural objects as they found them. Children walk single file, observe wildlife from a distance and leave natural food for native animals to forage. Children are asked not to build structures, furniture, or dig trenches. Thus, rather than exploiting nature for various human needs or desires, Mountain Explorations emphasizes concern for the preservation of natural diversity found in the park.

The Park Service’s perspective on wilderness preservation contrasted with Paige’s well-developed native ecological and utilitarian orientation toward nature that was based on her Navaho cultural heritage. Exercising an ethical reciprocity between humans and nature, Paige gathered berries, collected herbs for dyes and used natural objects for furniture in the woods by her apartment:

Instead of buying chairs, we could either sit on a rock or something and instead of buying wood you could get sticks and stuff. (utilitarian, hunter/gatherer) (Paige, Pre-Program interview, September 12, 2008)

During Mountain Explorations, Paige actively learned and practiced the leave no trace strategies. And, during the Each One Teach One activity, Paige added to her repertoire of cultural knowledge as she learned how salal and Oregon grape had been used by
particular indigenous groups of the Northwest. Respectful of the wilderness lands, she was eager to collect berries and leaves from these plants when she returned home.

Through instruction in wilderness etiquette, children became aware that by collecting journal notes, drawings and photos of natural objects and vistas, they were caring for nature by not taking natural artifacts home. For example, during the Human Camera activity, Hannah drew a pencil drawing of a lodgepole pine cone and gave it to her partner saying, “I wanted to give you the pine cone too, but I left it for the squirrels” (moralistic, concern) (Hannah, researcher field notes, day three, September 16, 2008).

As children engaged in the program, their initial concern and understanding grew from generalized care for nature expressed as not breaking tree limbs or cutting down trees, to more intimate concern for specific plants and animals that they have studied in the wilderness. For example, on the afternoon of Day One, children’s involvement in the program fostered noticing, naming and understanding specific plants along the trail. As they gave names to the plants and shared their knowledge with their peers through an educational activity called Each One Teach One, children’s moralistic concern for specific plants as parts of communities grew:

I liked going on the trails and learning stuff. My plant was called a rattlesnake plantain. Kenya and I found lots of them growing with salal, Oregon Grape and moss and I just flipped out when I stepped on one by accident. I remember, don’t bust the green! (moralistic, concern; scientific-ecological, observation, plants) (Kira, conversational interview, day one, September 17, 2008)

On Day Two at Mountain Explorations, children’s sense of their role in the wilderness community grew as they continued to create interconnections between parts of the forest community. Children were encouraged to taste a single salal berry, describe its taste in their journal, but leave the rest of the berries for native wildlife like bears. They
were instructed to touch and examine a moist, rotting nurse log, but not break it open to expose the living creatures inside. Children felt the texture of lichens growing on bark and described the colors and patterns but did collect any specimens. They visited a “hardened” creek area but left the aquatic invertebrates in the stream. After hearing a “bleating” bear cub in the forest, children responded first by moving away as a group and then reflecting on the presence of bears in the wilderness. Many children expressed a growing sense of concern for predators that live in the North Cascade wilderness:

You don’t want a bear to get along with humans or eat our food because if it got too friendly then you’d have to put it to sleep. (researcher field notes, day two September 18, 2008) (moralistic, ethical concern; humanistic, respect; symbolic, anthropomorphism)

On Day Three, children revisited the forest communities through a Silent Hike, created poetry and wrote reflections in their journals. As children reflected on their experiences in the wilderness, they were encouraged to share their feelings toward the planet and the non-human environment by creating an Unselfish Wish. The children’s experiences inspired and informed connections to the earth. Together these experiences encouraged a growing sense of ethical concern for nature and biophilia as indicated this small sampling of Unselfish Wishes:

I wish for respect of nature. (Lily)
I wish for a better world. (Nick)
Take an idea or something you loved from here and share. (Kenya)
I wish for more wolves. (Jerrod)
I wish for more green. (Spring)
I wish that everyone would come to Mountain Explorations to see wild animals. (Jesse)
I wish that in 100 years the forest would not be cut down. (Haley)
I wish everyone experiences Mountain Explorations. (Carmen)
In their wishes and words, these children illustrate hope, love, respect, sharing and cooperation toward a positive world.

After the program was over, children maintained their moralistic values developed during Mountain Explorations:

There are little plants growing everywhere – crusty lichens and feather mosses grow all over trees and rocks. I like looking at them. Sometimes I wonder if they are going to grow – It [Mountain Explorations] makes you notice and makes you wonder and care about them. (moralistic, concern; scientific-ecological, observation, plants) (Hannah, Post-Program interview October 23, 2008)

Closing Thoughts

In summary, my data analysis indicates that participation in the Mountain Explorations program contributed to children’s expressions of biophilia. Through their engagement in structured program activities (e.g. Forest Food Chain, Web of Life, Each One Teach One, Nature Writing and wilderness hikes), unstructured play, individual reflection, and nature discovery, children gained knowledge of the forest ecosystems, formed intimate connections with the plants and animals of Cascadia and most significantly cultivated feelings of love, care and respect for the forest ecosystem including charismatic fauna like bears. These findings support the work of other researchers who claim that biophilia, while innate, relies on experience, learning and social support for its expression (Wilson, 2005). These findings also support the claims of environmental educators educational researchers who advocate for deepening children’s affiliation with nature through experiential field-based programs that blend cognitive growth with affective or emotional/experiential knowledge (Kahn, 1999, 2002; Kellert, 1997, 2002; Louv, 2005; Pyle, 2002; Sobel, 2008).
Through analysis of children’s written and verbal responses to nature, I assessed the impacts of the Mountain Explorations program on children's expressions of biophilia. The nine value categories (scientific-ecological, naturalistic, symbolic aesthetic, humanistic, negativistic, moralistic, utilitarian, and dominionistic) provided a broad frame of analysis for assessing children’s written work and verbal expressions and understanding children’s biophilic tendencies. My analysis indicates that children participated in Mountain Explorations expressed a range of environmental values and extended their expressions of these values through their participation in the program.

More specifically, my research shows that children’s capacity to connect with nature, physically, cognitively and emotionally, grew as they participated in this environmental program. I observed increases in children’s expressions of aesthetic, humanistic, moralistic, symbolic, naturalistic and scientific-ecological values and a corresponding decrease in negativistic value. As children experienced the beauty and diverse ecosystems of the mountainous terrain their fears lessened and their biophilic tendencies blossomed.

Emotionally rich experiences in the wilderness of the North Cascade Mountains helped shape and strengthen children’s love of nature. Mountain Explorations encouraged growth in appreciation of nature as well as awe and respect inspired by the vastness and diversity of the wilderness. Through the program, children increased their desire to affiliate with the natural world.

Utilizing a naturalist's sense, I looked at and listened closely to individual children's perceptions of nature as they experienced the North Cascades Mountains. During my analysis, I identified two factors that may have enhanced children’s Mountain
Exploration experiences and contributed to their growing biophilia. One factor is based on the placement of the program, set deeply in the wilderness of the North Cascades Mountains. The other is related to the design of the Mountain Explorations program.

My analysis of children’s written and verbal responses to Mountain Explorations experiences including Forest Food Chain, Web of Life, Each One Teach One, Nature Writing and a variety of wilderness hikes suggest that these particular program elements foster rich biophilic expressions. These program elements created a learning cycle comprised of physical hiking in aesthetic places, educational trail activities that stimulate discovery and formal reflection that together evoke strong and long-lasting emotional connections. This cycle appeared to be influential in cultivating, supporting and strengthening children’s biophilia. During Post-Program interviews, Carmen captured the intent of the cycle as she recalled what she liked about the program:

You’re not sitting on chairs; you’re hiking. You don’t have anything hard to write on like a desk. You learn about the wild plants and animals – I thought Mountain Explorations was cool because I got to see a grey tree frog and a NW garter snake! We saw shelf fungus grow on a tree! We saw black bear prints and bear scat! We wrote poems in our journals! (Carmen, Post-Program interview, October 20, 2008)

My analysis suggests that progression to biophilia is not linear and the cycle may be repeated with many types of wilderness experiences.

In this chapter I have presented and discussed my analysis of 35 children’s responses to the Mountain Explorations program as seen in the interview and document responses from all participants. To provide an in-depth look at children’s engagement in a wilderness program and the ways program experiences can promote biophilia I now present three children’s Mountain Explorations stories.
CHAPTER SIX

CHILDREN’S STORIES AT MOUNTAIN EXPLORATIONS

In this chapter, I present in-depth stories of three children as they participate in Mountain Explorations to illustrate the various ways biophilia is expressed by children. I have chosen two girls and one boy that are representative of children’s diverse perceptions of nature. By looking closely at individual children’s experiences in nature, I can begin to assess the impacts of the Mountain Explorations program on children’s expressions of biophilia. For each child’s story, I provide a brief description of the child’s context, examine their experiences of nature at Mountain Explorations and reflect on their expressions of biophilia. I conclude this chapter with a discussion of the impacts of the Mountain Explorations program on children’s perceptions of nature and expressions of biophilia.

Anthony’s Story

In our first conversation together, Anthony described himself as a 10 year-old city boy (Anthony, Pre-Program interview, September 10, 2008). Anthony tells me that he is not really looking forward to Mountain Explorations because he is afraid of “falling off a cliff” and “running into a bear.” He tells me that he enjoys “looking at animals” and “hiking.” He admits that he is very interested in bears but doesn’t know much about them (Anthony, Pre-Program interview, September 10, 2008).

I include Anthony’s story because many children at Mountain Explorations share his fascination for bears. I have noticed that Anthony’s perceptions of nature are similar to many urban children, and have included his story as an important aspect for a discussion of biophilia. Anthony is interesting because he is so open about his concerns.
Seldom overtly expressive, Anthony, like his peers, becomes momentarily animated whenever the conversation turns to big animals like bears or cougars. He evidently harbors some tangible fear of these large enigmatic animals as evidenced by this free verse, written before Mountain Explorations:

Hey, this is a black bear, he will make you scared and he’s hungry and he will eat you like munchies. (Anthony, Mountain Explorations Journal, September 9, 2008)

**Anthony’s Experiences in Nature**


During the initial classroom visit by the Mountain Explorations staff, Anthony asks Leo, a Mountain Explorations instructor, a series of pointed questions about bears: “What do bears eat? I thought they hibernate now? What do you do if you see a bear?” (Anthony, researcher classroom notes, September 10, 2008). Anthony listens intently to Leo’s response:

Bears eat fruit, nuts, insects and fresh vegetation. Bears den-up in November and sleep tight through the winter. We avoid bears wherever possible. We make noise on the trail and don't run. Bears are like dogs and will follow a running person. Now, if you see a bear, speak calmly and back away slowly. (Anthony, researcher classroom notes, September 10, 2008)

As I watch Anthony during this exchange, his foot stops tapping and his eyebrows raise slightly. When I question Anthony after the presentation about his perceptions of bears, he shares that he still wants to “run from a bear.” He admits openly that he is scared to
actually see a bear in the wild (Anthony, researcher classroom notes, September 10, 2008).

It is the first day of Mountain Explorations and Anthony is huddled in the back of the school bus with his two best friends, Jesse and Luis, sharing imaginative bear stories as they travel “up river” toward the North Cascade Mountains. Sometimes serious and provocative, Anthony tries to imagine his own reactions at seeing a real bear. Like the river, Anthony’s conversation ebbs and flows, first with cautionary phrases, “Bears are big and strong you know,” followed by bravado “Yeah, but if you’re with your friends or act big they’ll leave you alone” (Anthony, researcher field notes, day one, September 17, 2008). In my notes, I start to refer to this threesome as the Bear Boys.

When Iris, a Mountain Explorations Instructor, joins the bus at the National Park Visitor Center for the short trip to the Learning Center, Anthony asks her about bears in the wilderness. I watch Anthony as Iris answers:

Here is what I learned from a bear biologist. First off, we will be extremely lucky to see a bear because they are typically shy and retreating around humans. Both black bears and grizzly eat a variety of foods, but they mostly eat plants. So, we avoid areas where bears forage for food. Black bears can climb trees easily and often leave big scratches on tree trunks. (Iris, researcher field notes, day one, September 17, 2008)

I observe Anthony’s surprised expression as he learns that bears are largely vegetarians. I listen as Anthony pushes Iris for a more explicit account of bear encounters. She continues:

Bears have good eyesight and an excellent sense of smell; they can detect scents from miles away. Through the year bears use a variety of habitats in the low valleys and high meadows. Like humans, bears are smart and individualistic. They learn quickly how to get food and garbage from people, a habit very difficult to break. (Iris, researcher field notes, day one, September 17, 2008)
Anthony speaks for the group of boys, “But what do we do when we see a bear?” I watch Anthony carefully as Iris explains bear etiquette on the trail:

If you were to see a bear, talk to it in a calm voice so you can be identified as human, not a threat. Do not stare into a bear’s eyes. This is sign of aggression. If there are several people, group together to present a single unit. Do not imitate bear growls, shout or wave your arms around frantically. Never approach a bear. If you hear bear sounds or see unattended cubs, be extremely cautious and leave the area silently the way you came. (Iris, researcher field notes, day one, September 17, 2008)

Anthony listens attentively as she speaks. Then, as demonstrated by his laughter, he expresses a sense of incredulous wonder when she tells them not to run from a bear, “You should back away facing the bear.” The smile on his face suggests the implausibility of standing face to face with a bear. The conversation ends abruptly when the bus turns down an incredibly steep, one-lane road to Diablo Dam and the Learning Center.

That night, Anthony has an unanticipated chance to apply his new knowledge of bears in a true wilderness setting. I am assigned to chaperone three students during the Night Hike to the dam and Anthony is in my group. Though we were walking as an entire class, Anthony stays within a pace of me at all times. It is dusk and the bats are hawking insects against the darkening sky. Anthony hesitates and asks, “If we see a bear, we will all run, right?” (Anthony, conversational interview, day one, September 17, 2008). I reassure him that bears are shy around big groups of people and a bear will certainly retreat into the woods. Anthony remains close to my side.

At the dam, I watch as Anthony becomes intrigued by the steady warm wind blowing up the concrete dam from the canyon below. He plays with his echoing voice down the canyon. During the walk back to the lodges, under a starry night sky, Anthony
ranges more freely from my side as he chats with a friend. He moves more confidently. We again watch bats flying over the boathouse lights. He tells me bats are really amazing since they can fly safely in the night.

Back at the Lodge that night, the three Bear Boys, Anthony, Jesse and Luis, who bunk together in the same room, convince themselves that a bear actually rummaged around making noises outside their window after lights out. The next morning, the second day of Mountain Explorations, Anthony begins to elaborate the experience for their peers and teachers. “We opened the window and we were going to sleep and then there was like ‘roooaaarr!’ and I was like whoa! In our room everyone yelled, ‘shut the door, shut the window.’ We slammed the window” (Anthony, researcher field notes, day two, September 18, 2008).

As their bear story spreads rapidly through the Mountain Explorations community, I note that few students challenge its authenticity, even as the story grows more grandiose. As the bear tale becomes more elaborate with each telling, Anthony soon believes that he had seen a dark shape move in the shadows. At the amphitheater, while waiting for the morning program, Anthony imitates the crouched posture and grunting sounds of a bear provoking general laughter from his peers. Reenacted frequently, I observe that the collaborative tale becomes part of the living fabric of the community’s Mountain Explorations experience.

On the second day of Mountain Explorations, Anthony’s trail group, the Cougars, attempts the rigorous hike to Sourdough Waterfall. Along the trail, near the Fawn Creek shelter Anthony observes a tree with scratch marks made by a bear or a cougar. During

\footnote{During Mountain Explorations, many children, especially boys, become focused on bears and staff refer to them as Bear Boys.}
the activity, Investigating Tracks, Anthony uses replica rubber tracks and field guides to see if he can identify the animal that left its mark on the tree. When Anthony holds the huge rubber bear track against the tree it matches the scratches on the tree. Anthony looks impressed.

Along the trail, Anthony learns Trail Tips such as not to step on the green that he interprets for me, “Don’t walk on the plants because you’d be killing them and they probably want to live” (Anthony, conversational interview, day two, September 18, 2008). Anthony learns from his trail leader how to walk silently like a bear. Anthony gets on all fours, sniffing the vegetation along the trail and making interconnections as he builds an increasingly complex understanding of the mountain ecosystem.

Anthony describes an unusually big and white mushroom as a decomposer during the Forest Food Chain activity. He also happily plays an interactive game called “Quinoa” designed help strengthen the learning community. In this game, Anthony and his classmates learn about the flora by adopting a native plant and teaching the group about their plant during Each One Teach One. In the afternoon, during a reflective Nature Writing activity along the trail, Anthony writes a poem about bears:

Black
Black Bear
It eats dead stuff, Big, Scary
Scarcity, hungry like never eaten before, Big black Giant
A big black gorilla

(Anthony, Mountain Explorations Journal, day two, September 18, 2008)

Reaching the Sourdough Waterfall, Anthony confidently describes the hike to me as “long” and we have “to climb rocks” to “avoid cliffs” near the “steep overlook” (Anthony, conversational interview, day two, September 18, 2008). He particularly
enjoys dousing in the cold melt water of Sourdough Creek. On the way back down the trail, the Cougars pass the Black Bear trail group at the pagoda-like Fawn Creek Shelter. Anthony learns from a friend that the Black Bears thought they had just heard a bleating sound from a bear cub “calling its mom” (Anthony, conversational interview, day two, September 18, 2008). This fascinating news inspires a long discussion among the Cougars on bear etiquette in the wilderness. That night at dinner, I question Anthony about the Black Bear’s memorable bear story. He succinctly recounts the story:

They heard a cub crying out in the forest. They tried yelling, Go away bear, and then they decided to leave quickly down the trail the way they had come.” (Anthony, conversational interview, day two, September 18, 2008)

After dinner, I watch Anthony playing touch football during free time. He is athletic and runs so fast that he remains flushed long after the game is over. That evening, Anthony attends a Bone Lab and presentation on predators. He is seated on the floor with his buddies, the Bear Boys, listening to a park ranger present on predators in the greater North Cascade ecosystem. When students raise their hands to answer the ranger’s questions about bear biology, Anthony quietly recites the answers to himself visibly mouthing the words as if to remember. At the close of the talk, Anthony raises his hand and asks, “Is it true that bears can really run faster up a hill than down?” I interpret this question as an expression of earnest respect for the imagined athletic ability of bears. By attempting to verify a fact about a bear’s strength, it appears that Anthony is “triangulating anecdotal evidence” that he learned from another instructor. As we leave the Bone Lab, I overhear Anthony and Jesse making a plan to check out a book about bears from the school library to learn more about the natural history of bears.
That night everyone gathers at the Lily Shelter for campfire songs and skits. During the song *Roots*, the children sing the chorus three times, “And the Roots go down, down, down.” Individual students are called on to add a new verse. Anthony raises his hand and volunteers, “I am a bear cub playing with his mother” (Anthony, researcher field notes, day two, September 18, 2008). Then, during their campfire skit he laughs as he and his *Bear Boys* buddies reenact an imagined bear encounter. Anthony ends up running in the opposite direction from the bear but then, as if remembering the correct bear response that he learned from Iris, he reverses to walk slowly backward away from the bear.

The next morning, Anthony is guided on a Silent Hike that culminates with him sitting alone and writing a reflective Post Card addressed to himself. These personal Post Cards will be hand delivered to their classroom in a month by their trail leader. Sitting quietly in the forest along Deer Creek, Anthony draws a labeled picture of himself and a friend at the waterfall – soaking wet. Under the picture he writes:

My favorite thing was when we went up to the waterfall and got all wet. (Anthony, Post Card, day three, September 19, 2008)

During the closing fire ceremony, the *Unselfish Wish* Anthony shares with the group is a reflection of his new emotional connections to nature and emergent biophilia:

I wish everyone could go up to Mountain Explorations, learn about the wilderness and nature. (Anthony, researcher field notes, day three, September 19, 2008)

**Anthony’s Emergent Biophilia**

Anthony arrives at Mountain Explorations with outward trepidation about bears and cliffs as reflected in his spoken and written words. I am interested in how Anthony forms new ideas and feelings about the mountain landscape and these mysterious
creatures. Anthony’s feelings about bears and cliffs in the wilderness are initially based in an absolute fear of the unknown. This is evident in his actions and verified in his final interview where Anthony recalls his vivid feelings about bears:

I thought it was like – I thought when we would walk by ourselves, I thought a bear was going to come out and like, ooh! (Anthony, Post-Program interview, October 21, 2008)

When combined with a frightful face and hands held warily above his head, the expression ooh speaks to the depth of his concern.

In the course of the Mountain Explorations program, Anthony has explicit instruction about predators including a Bone Lab, a presentation on North Cascades predators, and an Animal Tracks Lesson. He also plays a variety of games designed to teach him about ecosystem interactions such as Eagle Eyes and Web of Life. Along the trails Anthony encounters authentic bear scat, tracks and scratch marks on trees. One trail group claims to hear a bear cub. With his friends, Anthony hears and sees what they take to be a bear outside their lodge window late one night.

Anthony’s perceptions of bears in the wilderness are changing due to the influence of the program. When I ask Anthony why the Black Bear trail group moved after hearing the bear cub near Fawn Creek shelter, he gives a thoughtful response that shows his awareness of the issue of human-bear interactions as well as his ethical concern and his evolving understanding of bears:

You don’t want a bear to get along with humans because then you’d have to put it to sleep. (Anthony, conversational interview, day two, September 18, 2008)

Anthony’s reason for retreat reflects an emerging biocentric feeling that transcends an anthropogenic focus. He now knows that bears that become accustomed to humans often become destructive in their search for human food. Anthony does not report concern for
his personal safety or the safety of the group, though I know, having talked to the
instructors, that safety was foremost in the minds of the field leaders and many of the
students in the moment. Seen in this light, Anthony’s honest concern for the well being of
the bear was a simple expression of biophilia.

Anthony’s increased understanding and ethical concern is apparent from his
response to my question regarding his feeling about bears after Mountain Explorations.
He reports that he feels more knowledgeable about how to behave in bear country:

Yeah, to like don’t run, like act big, make a lot of noise and walk away quietly
backwards while making a lot of noise. (Anthony, Post-Program interview,
October 21, 2008)

He also feels less scared of bears because he is now more experienced in the wilderness:

Um, they’re not really scary now, like I’m not really a country boy, like out in the
woods, I’m a city boy, so I wasn’t used to it back then and I was scared, but now
I’m not, because I know what to do. (Anthony, Post-Program interview, October
21, 2008)

Because of his formative experiences at Mountain Explorations, Anthony feels that he
could better handle himself in the wilderness where bears make their homes. Anthony’s
authentic fear has transitioned to a more relaxed outlook in Post-Program interviews
because he has developed a respectful understanding of bears during the Mountain
Explorations program.

Though bears remain mysterious, instruction during Mountain Explorations has
provided Anthony with increased knowledge of mountain ecosystems including
intersections with bear biology. Through increased knowledge of the North Cascades
ecosystem and experience in the mountains, Anthony’s confidence and personal sense of
safety in the wilderness grows stronger. This allows him to relax and develop a deeper
affiliation with nature resulting in honest expressions of biophilia.
During our initial interview, I ask Anthony to describe wilderness. His reply is brief:

Like out in the forest, wild animals, that’s about it. (Anthony, Pre-Program interview, September 9, 2008)

I contrast this succinct description of wilderness with his elaborate letter to the PTA written the week after Mountain Explorations. Anthony demonstrates not only that he gained new knowledge but also addresses his new ethical concern for bears and expresses his aesthetic appeal for nature:

I learned a lot of things, that if there is a bear you don’t run because the mama bear will attack you. All the mama bear is trying to do is protect her babies. My favorite memory is when we went up to the waterfall and everyone got wet. The view and the waterfall were beautiful. I also learned that when a blue jays are calling they’re saying, Jay-Jay-Jay. (Anthony, letter to PTA, September 23, 2008)

He also explicitly describes his transition from being scared of the wilderness to being comfortable in the wilderness. He bases this transition on his relationship with nature that is a reflection of his experiences at Mountain Explorations:

I learned how to hike by myself and it seems like it is scary but it’s not. If you are afraid, try not being afraid. What is there to be afraid of, it is just the wilderness. Nothing is going to eat you. Just be quiet and listen. What do you hear? Look around, what’s around you? Do you see bears? I had the most fun of my entire life and the food was delicious. (Anthony, letter to PTA, September 23, 2008)

Anthony has certainly overcome his initial fear of bears. His positive experiences in the wilderness aroused his sense of biophilia.

Like a weaver, Anthony threads new ideas within his existing fabric to construct an initial concept about bears. Though Anthony’s noteworthy wildlife experiences are catalyzed by authentic physical evidence, i.e., claw marks on an alder tree, night sounds and muted cries in the forest, each experience also involves significant imagination on his part. Faint sounds become roars; claw marks on an alder tree become associated with
climbing gorillas. These momentous experiences provide a direct, even visceral affiliation with nature.

Though only one of the students in the two classes has ever seen a bear in the wild, bears and cougars play a significant role in children’s conception of wilderness. After watching Anthony and other children, I came to the understanding that children create their own socially constructed realities from their personal, social and cultural connections with nature. Wals (1994b) reflects on the importance of understanding the nature of an individual experience in shaping how we view and perceive nature: “The idiosyncrasy of experience and the contextual realms that bound experience cannot be ignored when studying people’s experiences and perceptions of nature” (p. 95).

According to Wals, our increased understanding comes from elicitation and reflection of children’s dynamic mental constructions as they interact with a changing world. The bear encounters provide the impetus for children to challenge their preconceptions and develop new understandings aligned with biophilia. Eventually, the Bear Boys’ well-established fascination for bears becomes a source of narrative story that permeates and flavors the entire group’s affiliation with nature.

From a researcher perspective, my reflection on the bear encounter helps reshape my own understanding of biophilia. Specifically, I begin to see how the presence of bears and other charismatic wildlife in a wilderness inspires in children a deep affiliation with the natural world. I realize that children do not need to actually see a bear to feel its effect. It is enough to imagine its presence. The power of these imaginings and social constructions is illustrated in the bear scenarios from Mountain Explorations.
I now understand that the enigmatic bear represents a powerful force for all the children visiting this wilderness. Regardless of whether children actually see a bear, they often feel the presence of bears as a community phenomenon. Subsequently, the human community grows accustomed to the fact that large animals live in the surrounding wilderness. As the community moves toward a deeper understanding of the wilderness and bear biology, the power of their shared imaginings and social constructions can help change negativistic values to moralistic values characterized by concern and ethical treatment of nature. The community’s positive affiliation with the nature grows stronger as fears diminish.

**Carmen’s Story**

Carmen is an 11-year old student in Ms. Morino’s class. Spanish is her first language but she is English/Spanish bilingual. During our first conversation together I learn that Carmen lives outside of town on a small farm with cows, pigs, chickens, a horse, dogs and numerous cats. She shares the daily chores of feeding the animals with her six siblings. At school Carmen appears to embrace her studies with such a positive compassion and interest that she easily gains the favorable attention of her teachers and is a leader among her peers in the classroom and playground.

Carmen describes her back yard as a place for imaginative play where she investigates nature intimately. Like a young naturalist, Carmen gets down on her hands and knees to follow bugs and beetles across the pasture. During these journeys, she makes little homes for the bugs with grass and twigs. She also attempts to feed the bugs little worms and reports, “I feel like I did something good instead of smushing stuff” (Carmen, Pre-Program interview, September 9, 2008).
One of Carmen’s favorite nature activities is “to get on her boots and old stuff and look around for animals” with her mom (Carmen, Pre-Program interview September 9, 2008). Sometimes they follow their horse into the forest and look for deer. On past expeditions she has caught toads, tree frogs, and lots of grasshoppers but her favorite activity is to watch deer in the forest:

I feel kind of special to see all these animals, like you never get to see when you’re in town. Like when I see a deer and it looks at me – it’s sort of cool. (Carmen, Pre-Program interview, September 9, 2008)

Carmen tells me that she is looking forward to Mountain Explorations, and hopes to see “animals and nature” and “a different kind of bird that nobody has discovered!” (Carmen, Pre-Program interview, September 9, 2008)

I decided to study Carmen because compared to her more urban peers, like Anthony, she demonstrates a distinctive biophilic perspective expressed clearly when she describes her special connection to animals. Because she is such an attentive young naturalist, I am interested in the impact of Mountain Explorations on her emergent expressions of biophilia. Carmen’s intrinsic biophilia is poised for growth as she is introduced to the wilderness of the North Cascade Mountains through an environmental education program that emphasizes an intellectual and emotional connection to the living environment.

**Carmen’s Experiences in Nature**

Carmen’s first day of Mountain Explorations includes interactive discovery of the interconnectedness of forest ecosystems through discussions and games that link geology and weather with the Web of Life. As we prepare for the first trail walk, Carmen enthusiastically tells her friends, “I can’t believe we are here. It’s so green! Look at that
moss!” (Carmen, researcher field notes, day one, September 17, 2008) I spend the afternoon observing Carmen and her two best friends, Ava and Haley, who are all assigned to the Cougar trail group.

As she rounds the Peninsula Trail on our first hike together with a slow deliberate pace, I notice that Carmen excitedly makes continuous observations and writes field notes in her journal of the living green nature. Even during the formal lessons on weather, geology and the web of life conducted by Kip, our trail leader, Carmen’s attention is drawn to the forest, “I hear a racket in the bushes! See Haley! I think it is a squirrel.” (Carmen, researcher field notes, day one, September 17, 2008)

Later, during a lesson on water and glaciers of the North Cascades, Carmen is again making observations. She intently points upwards to the Pyramid Peak glacier and politely interrupts Kip, “Look at all that snow! Kip, is that a person up there, on the icy mountain?” (Carmen, researcher field notes, day one, September 17, 2008) With feedback from Kip and the use of his binoculars, Carmen learns to accommodate her naturalist’s eye for the long perspectives of mountainous landscapes. She looks intrigued to learn that what she thought was a person is actually a lone tree in a snowfield.

After circling back to the amphitheater, the children move into their rooms and prepare for free-time activities. Carrying our bags up to the lodges, I overhear Carmen exclaim to her friend Ava, “Kip is awesome. He makes learning about plants and animals up here fun!” After unpacking, she races off to play touch football at the amphitheater.

That evening all the trail groups go out on a quiet night hike. Like other children, Carmen is momentarily unnerved by the darkness that surrounds us. I observe that soon Carmen walks confidently in the twilight with her two friends and a parent chaperone.
We stop to watch bats catching insects around a boathouse light. Pausing at the lakeshore, Ms. Morino, their teacher, sees a shooting star. Carmen and Ava shift their attention to patiently watch for another meteor to cross the night sky. The stars are mesmerizing. Kip helps our small group find a bright planet, a twinkling satellite and the glowing arms of the Milky Way. Carmen is ecstatic at these unexpected discoveries, “Can you believe all the stars are suns, like ours! We’re so tiny.”

Without warning a shadowy blue heron lifts from the lakeshore and croaks once, drawing us from the arms of the galaxy back to the living earth. A breeze blows across the glistening lake. The water sparkles and leaves rustle. We turn from the starry sky to walk back to the lodges. I contemplate how the night hike is a site of initiation, where children expand the dimensions of their universe by looking in to discover how small and precious our world really is. At the same time children become deeply grounded as they immerse themselves in the multi-sensory layers of their immediate natural environment.

On Day Two, our Biotic Day, I join Carmen and the rest of the Cougars who set out to hike the 3-kilometer trail to Sourdough Waterfall. I watch as Carmen practices her silent walking skills that Kip had taught on Day One during our first trail hike. Stepping lightly down the trail like a fast-footed fox, Carmen smiles as she concentrates on her delicate movements. When we rest, she comments to me that she likes being a silent fox in the forest because she can “see, hear and smell so well!” (Carmen, conversational interview, day two, September 18, 2008) Again, moving along the trail, I observe Carmen carefully studying a wide range of mountain environments, from lodgepole pine forests and alder slides to xeric talus slopes.
Continuing up the trail, Carmen pauses at the Fawn Creek shelter to examine an alder tree with long scratch marks. I notice that she becomes fully absorbed in the Investigating Tracks activity that helps her explore the mystery of the morning, “Who made the scratch marks on the tree?” Working with Ava, Carmen uses a field guide and track key to identify one of a half dozen replica rubber mammal tracks. Carmen systematically notes in her Mountain Explorations journal that her rubber track “has four claws and bumps on the bottom of the foot.” Using her evidence, she then makes a prediction in her journal, “I think the foot is from a wolf.” Now, she begins to investigate the track in more detail. “The print is a brown color and has claws. I’ll use a magnifying glass.” Carmen gathers more data noting the rough footpads like “sandpaper.” She recounts the number of toes and claws and measures the length and width of the track and notes its general shape. Her inquiry almost complete, she concludes, “I found that the track is a gray wolf” though she indicates it would be easier to identify the track if she had seen the “whole body of the gray wolf” (Carmen, Mountain Explorations Journal, day two, September 18, 2008).

Borrowing several animal track samples, Carmen enthusiastically continues her systematic field study by holding each rubber track to the alder tree to investigate a match for the scratches. With excitement in her voice, she announces resolutely to Ava that, “A black bear left these scratches. “See the claws of the bear are a better match than the cougar’s claws” (Carmen, researcher field notes, day two, September 18, 2008). When other members of the Cougar Trail group join in the discussion, I observe Carmen as she illustrates her inquiry process by holding the tracks against the bark. She allows everyone to assess the evidence for themselves. Carmen’s initial success with naturalistic study
predisposes her to utilize systematic inquiry the rest of the day as she continues her investigation of animals and predators during the Forest Food Chains activity.

Above Deer Creek, at the first switch back along the trail, Carmen discovers several clumps of feathers along the side of the trail. Carmen and Ava use a field guide to identify the ginger-colored contour feathers and gray-banded tail feathers as once belonging to a Sooty Grouse (*Dendragapus fuliginosus*). Carmen does not wait for Kip to ask, “What happened to the grouse?” I see that Carmen and Ava are behaving like naturalists, collecting more field evidence by fanning out along the trail looking for more feathers.

As Carmen speculates on the feathers saying, “I think they were plucked from that grouse, maybe it was in a fight.” She carefully decides to expand her search by scanning the immediate landscape. Carmen and Ava locate a large “nurse log” along the trail. Standing by the moist log that is decaying slowly into the earth, Carmen notices more feathers near several young hemlock saplings. Along a mossy segment of the log, Carmen locates a furry tail, possibly from a squirrel. Carmen infers that something ate the grouse and the squirrel but Kip’s question stumps her, “What animal would leave just feathers and a tail?” While Carmen and her peers record their initial observational evidence in their journals, I quietly confer with Kip and we decide the evidence is consistent with predation by a large accipiter like a Northern Goshawk (*Accipiter gentilis*).

From our initial discussion, Carmen lists the possible predators in her journal: bear, cougar, coyote, owl, raccoon. Carmen tells me that it appears that the grouse was plucked and eaten right on the log. At Kip’s prompt, she looks closely at several feather
shafts. Carmen agrees with Kip that many of the big feathers have cleanly clipped shafts, “like they were cut with scissors,” while other feathers appear plucked. Unable to resolve the mystery but alive with biophilic curiosity, Carmen continues down the trail. She leaves all the artifacts for other trail groups to discover and takes only her field notes as evidence.

At the upper shelter Carmen engages in a cooperative Web of Life game with the Cougars. Children again sit in a circle and use yarn to build a new food chain of producers, consumers and decomposers of the North Cascade Mountains. Carmen is assigned the Northern Goshawk card. I watch as she reads the back of the card. Carmen smiles as she learns that Northern Goshawks hunt in the dense forest cover during the day, capturing birds like crows, woodpeckers and grouse, as well as squirrels and rabbits. When it is her turn to toss the yarn, she excitedly tosses the yarn to Douglas squirrel saying, “I’m a Northern Goshawk that lives in forests like we’re sitting in now. I eat grouse and squirrels on nurse logs just like the one we saw along this trail” (Carmen, researcher field notes, day two, September 18, 2008).

As we walk down the trail, Carmen mentions to me that she loves playing the wildlife mystery game and that she is particularly excited to be learning about new forest animals. Pausing to watch a squirrel methodically shredding a pinecone for the seeds, Carmen confidently tells Hannah and me, “It is hard to believe that a Northern Goshawk swooped down and captured that other squirrel. I’m sorry for the squirrel, but I guess they have to eat too. I would love to see one” (Carmen, conversational interview, day two, September 18, 2008). I am surprised by her pragmatic view of forest food chains and
wonder if her experiences on the family farm have supported her enlarged understanding of animal niches in the forest.

Later that afternoon, Carmen reaches the Sourdough Overlook and Waterfall. Her legs are tired by the long physical exertion through the mountains but she is ecstatic about the vista and tells happily me “Now, I have mountain goat legs. I could enjoy this view forever” (Carmen, conversational interview, day two, September 18, 2008). After playing in the creek, the gorgeous views of Pyramid and Cathedral peaks are the backdrop for a Forest Food Chain journal activity. Carmen writes that a “community is a group of people that live together in Cascade County” (Carmen, researcher field notes, field notes, day two, September 18, 2008). To represent the interconnectedness of the forest food chain, she draws a girl, tree and fungus. I notice that her understanding of the ecology of forest ecosystem is building, as she adds a squirrel to the drawing. She explains that the squirrel is a consumer but will be captured by a goshawk and the worms and bugs will decompose what’s left of the squirrel (Carmen, Mountain Explorations journal, day two, September 18, 2008).

Reaching the Whispering Pines Shelter, the Cougars engage in a creative writing and drawing exercise. Carmen draws a forest ecosystem; her picture and narrative describe a cartoon-like “human covered in plants” as camouflage. She explains in her journal, “He is trying to blend in” to the environment so the “cougar doesn’t attack him” (Carmen, Mountain Explorations Journal, day two, September 18, 2008). When I ask Carmen about her drawing, she laughs and explains that she wants to see a cougar so badly that she wishes she had a camouflage outfit so she could blend into the forest like the cougar (Carmen, conversational interview, day two, September 18, 2008).
Later, during another trailside creative writing activity, Carmen combines aspects of her home life on the farm with her wilderness experiences to create a story about a bear in the mountains that reveals several of her preconceptions about bears (the italics are Carmen’s responses to the plain text story prompts):

If I were a bear, my enemies would be wolverines, cougars, owls and human beings. I would be a predator on deer, pigs, cows and lambs. I would eat meat, like deer and coyote meat and I think I might eat plants. I would live in the mountains or the woods. Some ways that humans affect my habitat are by leaving trash, destroying my home, busting the green, air pollution, and poisonous leaves which deer eat and poison bears. (Carmen, Mountain Explorations Journal, day two, September 18, 2008)

Initially, she relies heavily on her previous knowledge based on her experiences on the farm. However, as she engages in the program she increasingly relies on knowledge and ethical concern gained in the program.

The next time that I catch up with the Cougars is during the evening’s activity held in the Terrestrial Lab. The Cougars are investigating animal skulls from predators in the North Cascades Mountains. During the Bone Lab, Carmen respectfully holds the bear skull for her trail group to inspect while Kip illustrates how the bear’s unique teeth help it eat a variety of foods like roots, leaves, fruit, nuts and berries. Carmen asks Kip, “What about meat?” Her presuppositions about the bears niche are being challenged as she learns that bears occasionally eat insects and grubs that are high in fat content but Carmen looks surprised to learn that meat is low on bear’s list of preferred foods.

It is Day Three, our final day at Mountain Explorations, and the Cougars are engaged with reflective activities. Carmen strengthens her attachment to the wilderness as she participates in a series of writing and reflective activities that are scheduled for the
day. One of the activities is a Silent Hike through the forest where children get to be
alone in nature. When Carmen emerges from her solo hike, she moves peacefully up the
trail and calmly joins her friends sitting in the green corridor. The children are together
but everyone is quiet, as if being alone in nature had moved them spiritually toward
inward reflection. Later, she works for fifteen minutes writing and decorating a post card
addressed to herself. The post card will be hand delivered back to the school later that fall
by Kip. She is declarative about her experience at Mountain Explorations enlarging her
sense of biophilia:

I had a wonderful time at Mountain Explorations. It was the best experience I
have ever had. I heard lots of new animal sounds like “ribbet” from a grey tree
frog and “ccccca” from a Douglas squirrel. I got to see a beautiful Steller’s Jay. I
thought Mountain Explorations was a blast. (Carmen, post card, day three,
September 19, 2008)

During our final interview, I read her initial impression of nature back to her (i.e., plants
and trees and animals and lots of dirt) and ask if she would add anything after her
Mountain Explorations experience. She nods her head affirmatively and remembering her
time in the wilderness she adds vivid biophilic details:

Well it’s beautiful and I love all the animals that live there – I can’t believe the
animals get all that – they have a big beautiful home! During the Silent Hike you
could hear sounds and could see squirrels and chipmunks and we got to see that
blue bird – I think a blue Steller’s Jay. When I walked over the bridge I saw water
and then saw a chipmunk sitting and starring at me – and I say hi. And, I heard a
tree frog. On the Night Hike I saw bats flying above my head catching insects –
that was just amazing. I loved that! I never knew bats lived in the mountains.
(Carmen, Post-program interview, October 20, 2008)

Carmen’s emotive narrative is like a biophilic cascade down the page. Her experiences in
the wilderness setting of Mountain Explorations have enlarged her perception of
ecosystem interconnections as her affiliation and emotional connection to nature grew.
**Carmen’s Emergent Biophilia**

As Carmen participates in the Mountain Explorations program and reflects upon her experiences in the wilderness, she deepens and strengthens her biophilia. She engages fully in the Mountain Explorations program and forges a close relationship with the plants and animals of the mountainous landscape. Carmen arrives at Mountain Explorations with a strong foundation of naturalist’s skills and is eager to develop these skills and extend her knowledge of the natural world in the new wilderness setting. With singular motivation and a beautiful naïveté, she is determined to discover a new bird species in the mountains. As Carmen gains knowledge, develops her naturalist’s skills and builds emotional connections to the mountains, she becomes quite expressive about her love for the North Cascade Mountains. This is emergent biophilia in action.

Carmen’s previous knowledge about animals and plants comes largely from watching and caring for the plants and animals on her family’s farm. She initially relies heavily on her previous farm knowledge. However, as she engages in activities she begins to focus on knowledge gained through a range of experiences provided by the program. Carmen’s emergent biophilia is poised for growth at Mountain Explorations as she is introduced to formal environmental education that blends a cognitive and emotional connection to nature.

Carmen discovers new ways of learning about nature that deepen her connection to the natural world. For example, during the Microscope Lab, I watch as Carmen examines nature up close. She begins to differentiate producers, consumers and decomposers. Carmen is ecstatic to find “tiny living bugs on a piece of wood! Possible decomposers!” (Carmen, researcher field notes, day two, September 18, 2008). She first
draws a labeled picture of her discovery, then, she describes what she learned and finally creates a poem that combines both her scientific and aesthetic knowledge. By encouraging combined expressions of cognitive and emotional knowledge of the small animals, plants and fungus in the wilderness, this activity empowers looking carefully and deeply at nature.

Carmen’s early and unsophisticated scientific-ecological perceptions of nature grow as she made new ecosystem discoveries and interconnections during trail activities. Initially, Carmen describes nature in simple ecological terms, as “plants and trees and animals and lots of dirt” (Carmen, Pre-Program interview, September 9, 2008). Her words focus primarily on broad, general and indistinct categories, devoid of deeper interconnections associated with ecological sophistication.

When Carmen is introduced to systematic study through a hands-on Investigating Tracks field activity, she reports that she loves learning about animals that inhabit the forest. She is thrilled to discover that bears can leave scratch marks on trees. Her experiential field knowledge is augmented by a special evening presentation on the Predators of the North Cascade Mountains followed by a Bone Lab in which Carmen systematically examines the skulls of a variety of mammalian predators including bear, coyote, and cougar. She begins to make sophisticated connections between a predator’s ecological niche, habitat preference and behaviors. Building on her initial conceptions of forest food chains (e.g., bears eat most animals including farm animals), she builds more accurate understandings of forest organisms (e.g., bears are primarily vegetarians).

Carmen has many opportunities to reinforce and build her understanding of the interconnectedness of organisms in the mountains. For instance, she plays the interactive
game, Web of Life, in which children use yarn to illustrate the relationships between organisms found in the North Cascade Mountains. Then, immersed in multi-sensory experiences along the trails, Carmen develops her knowledge of interactions between trees, understory species, animals and the abiotic environment. By studying the complex relationships between an organism and its environment through these activities, she incrementally builds her concept of the larger forest ecosystem.

Carmen also strengthens her naturalist’s abilities of exploration and discovery during her hiking experiences in the wilderness. For example, she employs her naturalist’s skills to develop her concept of Forest Food Chains. Using empirically derived evidence, she concludes that a Northern Goshawk preyed upon a grouse and a squirrel. She is developing a pragmatic understanding of forest food chains and though she happily watches squirrels chewing cones for seeds, she is eager to see a goshawk hunt a bird or rodent.

Carmen’s ability to love nature requires her to acknowledge the role that death plays in the cycle of renewals – the endless transfers of energy and matter between abiotic and biotic. Carmen’s farm experience, raising cows, sheep and chickens for meat, may have predisposed her to quickly accept the predation of the grouse and squirrel. As her knowledge of the parts of the ecosystem grew so did her understanding of the interconnectedness of community organisms.

Carmen’s concern for the natural world and care for the wildlife that inhabit the wilderness deepens throughout Mountain Explorations. As Carmen explores the green mountains with lush understory, rushing creeks with cold, clear cascades, and abundant wildlife, she is inspired by the beauty and diversity to investigate questions about her
relationship with the forest community. During all the hikes, Carmen engages in discussions with her trail group on wilderness etiquette. These discussions extend her ethic of care simple strategies like staying on the trail (e.g. Don’t bust the Green!) and handling food in a “wildlife friendly” way to the ethical care for charismatic wildlife like bears in the wilderness.

Carmen learns and applies these ethical concepts as she develops her moralistic value for nature. For instance, she introduces to the group that it is important to “leave animals alone” in a wilderness because “it is their home, we are visitors.” During snack time, each child is given a colorful bandana to spread on the ground and collect all the food crumbs. Carmen reminds her trail group, “We use the bandanas so that we don’t feed the wild animals. Our food is unhealthy for wild animals” (Carmen, researcher field notes, September 17, 2008). With Kip’s guidance, Carmen is actively making environmental connections between her actions and the larger ecosystem.

Carmen’s affiliation and emotional attachment for the wilderness deepens throughout Mountain Explorations. The last day of the program, Carmen and her trail group walk one of the familiar trails to review their knowledge of the forest ecosystem. Next they engage in a Silent Hike followed by a powerful reflective creative Nature Writing activity. Sitting on the trail and surrounded by familiar plants and animals, Carmen is inspired to write about her affiliation, concern and hope for the diverse biotic environment. A line from Carmen’s post card speaks to her deep concern for nature:

My favorite thing to do at Mountain Explorations is to learn about how much damage people can do to nature but that we can help because I love nature. (Carmen, postcard, day three, September 19, 2008)
At the closing fire circle everyone gathers before the small fire to share their Unselfish Wish with the group. Carmen’s wish reflects her emotional connection to the North Cascade Mountains and her growing sense of biophilia:

I wish everyone could come to Mountain Explorations, the whole, entire world, because it’s an awesome place to learn! (Carmen, researcher field notes, closing fire, day three, September 19, 2008)

Being in the field with Carmen was a real pleasure. I enjoyed watching her purposeful approach to field observations. Her growing understanding of the wilderness encompassed intellectual, physical, emotional, and spiritual dimensions spoke to her naturalist’s sensibilities. Mountain Explorations validated her belief, expressed in her journal the last day of Mountain Explorations:

Nature is an amazing thing to see, touch, and learn about everyday! (Carmen, Mount Explorations Journal, day three, September 19, 2008)

The transformational experience of the natural world requires Carmen’s active physical participation within her immediate environment. Through her positive experiences in nature at Mountain Explorations, Carmen’s expressions of biophilia grew beyond her farm to include the larger North Cascade ecosystem. Her familiarity with the mountains effectively extends from her “backyard” to include the wilds of the North Cascades. More importantly, her sense of biophilia now extends from the valleys to the mountaintops.

Eight months after Mountain Explorations had concluded, I was walking home from my office through town when an energetic voice called my name. Full of spontaneity, Carmen was beaming over our serendipitous meeting. As we passed on the sidewalk, Carmen shouted back to me, “I love Mountain Explorations, I love nature!”
Her words are not just a child’s praise for the program, but further, a tribute to the power of realized biophilia.

**Paige’s Story**

Paige is a Grade 5 student in Ms. Ashby’s class at Flynn Park Elementary and attended Mountain Explorations before Ms. Morino’s class. She lives in the same apartment complex near a busy shopping center as do many of her close friends. During our first interview together, Paige dreamily describes a small patch of woods with a trail and berries behind her apartment. Sometimes her mom allows her to go down the trail to a remnant wetland and creek where she uses plants to make “colored water” to dye cloth scraps. She is proud of her practical knowledge of herbs and dyes that she has learned from her grandmother who has introduced to her some traditional Navajo arts and practices. Paige avoids technology and is drawn emotionally to animals. Within the first few minutes of our initial interview together, Paige offers a glimpse into her Navajo perspective by contrasting nature with technology:

> Instead of using all the technology, I like to kind of . . . use nature instead of the new things. Instead of . . . maybe . . . buying chairs . . . we could either sit on a rock or something . . . and instead of buying wood you could get sticks. (Paige, Pre-Program interview, September 12, 2008)

Paige has several aspirations for her time at Mountain Explorations. One of Paige’s interests is to see animals. At home, she does not have the opportunity to travel outside of the city, so she is looking forward to seeing animals at Mountain Explorations. She is also interested in comparing the lowland plants growing along the creek near her apartment with the mountain flora. Paige is also looking forward to hiking in wilderness, free of noise and cars.
I include Paige’s story because she displayed a gentle reflective presence and an emotional sensitivity to nature that I wanted to better understand. Also, her actions and conversations reveal biophilic influences of her Navajo culture and family. I was interested in how her experiences at Mountain Explorations are incorporated with her native biophilia and wondered if her experiences in the program would extend or eclipse her indigenous biophilia.

**Paige’s Experiences in Nature**

On Day One of Mountain Explorations we arrive at the National Park Visitor Center, eager to move around after two hours of travel. Paige’s first exposure to the North Cascades National Park occurs in the museum-like visitor center. Paige’s class begins an activity called the Visitor Center Scavenger Hunt that emphasizes people and animals in the North Cascade Mountains. She glides quickly past the huge relief map with automated red locator lights activated by mechanical buttons. Lingering at the animal habitat dioramas she tells me that she loves the animals (Paige, conversational interview, day one, September 15, 2008). Drawn to a large sunlit glass door, I watch as Paige and her friend Grace move swiftly outside to explore the short path to an overlook. I trail along next to them as the rest of the class ventures down the path.

Paige ambles down the wooden boardwalk toward an especially spectacular view of the dagger like Picket Range at the headwaters of the Goodal Creek drainage. As she moves silently over the elevated walkway, Paige is surrounded by green, yet isolated from direct contact with nature. At the overlook, Paige stops to touch and hold a hemlock bough that has opportunistically grown over the boardwalk. I notice that she lingers quietly at the overlook and is the last child to leave the viewpoint trailing behind Grace.
Later that afternoon at the Learning Center, Paige joins her trail group in a study of forest biodiversity. I join Paige’s trail group as they walk the Peninsula Trail making observations. When a butterfly sails across the trail in front of her, Paige smiles and calmly announces to her trail group, “There’s a beautiful blue butterfly.” While several children use field guides to identify the butterfly as a Western blue, Paige remains absorbed in watching the butterfly. Moments pass as it flutters along the trail, pausing in sun lit patches and advancing again. Still watching the butterfly Paige asks speculatively, “I wonder where it is going and what it is eating?” (Paige, researcher field notes, day one, September 15, 2008).

I notice that Paige is experiencing the natural world at her own pace with Bonny, her trail leader, acknowledging and supporting her observations of nature rather than directing her nature study. Paige hears drumming and locates a woodpecker on a tree. Through lengthy observation and the help of a field guide to birds, several other children identify the bird as a Red-breasted Sapsucker (*Sphyrapicus ruber*). In the meantime, Paige appears more interested in the sapsucker’s behavior than its identity.

She quietly helps her trail group relocate the bird, “See, it is still on that smooth tree. It has a white stripe down its side. I like how it made all those sap holes in a row on the bark. Don’t you like it?” (Paige, researcher field notes, day one, September 15, 2008) While Paige ponders sapsuckers and their interactions with their environment, I observe that Paige seems to intrinsically value first-hand experience with wildlife over book-learned knowledge about nature. Paige also seems authentically interested in forming deeper connections with the animals she discovers.
Paige listens to Bonny, encouraging everyone to use all their senses, to “Look, listen and smell the forest.” I notice Paige pausing to touch and smell a pinch of rich forest duff. She mirrors Bonny’s multisensory observational behaviors saying, “It’s sandy, dark, with needles, smells like the wet earth. It feels good” (Paige, researcher field notes, day one, September 15, 2008).

Following Bonny’s lead, Paige saunters down the trail, walking like a stealthy cougar. Looking slowly from side to side with cat-like interest, Paige next observes a chipmunk. Smiling again she tells her trail group:

Look at the chipmunk. It just chewed a chunk from that mushroom and is running past us! See there it is resting on the stump! I wonder if they eat mushrooms. (Paige, researcher field notes, day one, September 15, 2008)

Bonny encourages the children to take notes of their field impressions in their Mountain Explorations journals. While several children take pictures of the chipmunk, Paige patiently captures her observations on paper, drawing a little picture of a chipmunk with a mushroom in its mouth.

Next, Paige engages in a Web of Life activity. Sitting comfortably in the circle on the ground, Paige listens as Bonny helps the children understand how the forest animals and plants are interconnected in food chains. All the children are assigned plant and animal cards that provide information about their role in the forest food chain. Paige reads her card with facts about a forest plant called Oregon grape. With a serious look on her face, she catches the yarn from Bonny the “sun” and then tosses the ball to the “black tailed deer.” She softly and hesitantly repeats that, “as a forest producer I receive energy from the sun [pausing to collect her thoughts] but give shade and food to the deer who nibbles my leaves” (Paige, researcher field notes, day one, September 15, 2008).
As our forest food web is completed and Bonny summarizes the activity by asking questions, my attention strays to a distant pair of ravens cavorting high over the lake. As they draw near, Bonny suspends the discussion and everyone watches the ravens belly rolling, maple leafing and looping carelessly over the lake as if they are playing a game. Once again we are watching the behavior of real animals and Paige is watching intently and smiling.

Taking our cue from the ravens, we play a hide-and-seek game about camouflage called Eagle Eyes. Paige is the eagle and gets a chance to practice her observational skills. She closes her eyes as all the children hide like animals in the forest with the stipulation that their head remains in full view of the eagle. Standing in one place, Paige opens her eyes and slowly turns in a circle searching for her friends in the adjacent forest landscape. Pointing to Colin she says encouragingly, “Your grey coat blends with the boulder like a lizard!” When it is Paige’s turn to hide, she and Grace weave themselves within a lacy vine maple. They are the last to be discovered and emerge from their hiding place mimicking the stealthy walk of cougars. Everyone laughs.

Day Two is Biotic Day and Paige embarks on strenuous 3-kilometer hike to Sourdough Waterfall. I have provided each trail group a 27-shot camera so that children could take pictures of their experiences in nature at Mountain Explorations. Since Paige is without a camera, she carries the group camera. I notice as we hike that she never uses the camera and I wonder if she is too busy directly experiencing nature along the trail to worry about taking pictures.

At the waterfall, I notice that several of Paige’s friends are taking multiple shots of the cascading water with their own cameras. Remaining true to her wish to avoid
technology at Mountain Explorations, Paige is not taking pictures. She seems to prefer to experience nature directly soaking in the vistas and playfully splashing in the creek. I ask her how she feels about the hike and she replies with balanced enthusiasm, “It is so long and tiring! I loved eating lunch at the beautiful waterfall and getting our hair wet in the icy water! Did you see Kyle drop his camera in the water so we had to let it dry in the sun?” (Paige, conversational interview, day two, September 16, 2008). When I inquire about her camera, Paige tells me simply that it is safe in her backpack.

During the trail activity Each One Teach One, Paige is assigned to teach her trail group about a small understory shrub with evergreen leaves and edible berries called salal. To help her learn about salal and then teach her peers, Bonny gives Paige a handwritten laminated note card. On one side is a drawing and on the other side is a list of fascinating facts about salal that includes ethnobotanical information about the plant community.

Children expectantly stand by their assigned plant to wait their turn to teach. Moving down the trail, I stop at each station and learn about the forest plants. Reaching Paige, she enthusiastically tells me “Salal was a favorite food plant of First Nations people along the Northwest Coast. They ate the fruit fresh they dried them and sweetened cakes with salal berries. Today, you can try one purple berry but wildlife like bears get to eat the rest. I love them” (Paige, conversational interview, day two, September 16, 2008). Then gracefully stepping across the trail, she smiles invitingly and points to Oregon grape, saying, “Try these berries too. They’re kind of sour though.” Looking off into the green forest, she shares, “My mom is studying to be a nurse and tells me I am a good with herbs.” Then Paige adds, “I hope that salal will be growing along my creek. I want
to show my mom these plants and maybe try mashing the two berries together” (Paige, conversational interview, day two, September 16, 2008). Paige definitely identifies with plants and seems pleased to share her new knowledge and connection to the plant community.

That evening after campfire songs, all the trail groups embark on a special night hike through the forest without flashlights. I join Paige’s lodge group to explore Deer Creek and to call for owls. As we thread our way into the forest, Paige notices that, “It’s darker under the trees.” Bonny tells us, “To observe elusive nocturnal species, you must become one with the night” (researcher field notes, day two, September 16, 2008). Feeling her way forward, Paige is drawn toward the bats hawking insects around the dim light of the Pump House. I hear her tell Grace how “awesome” it is to find real bats in the mountains.

Reaching the Deer Creek Shelter, our eyes are still accommodating to the night. Paige and Grace whisper to me, “Can you call an owl now?” After what seems like minutes of quiet sitting, I abruptly call into the night, “who-who-who-who, who-who-who-who-woowhhaa” (who-cooks-for-you, who-cooks-for-you-all). In the silence that follows, no one moves, the air feels damp, water laps gently in the creek bed and a few leaves rustle. We are reaching into the night. Remarkably a distant Barred Owl answers from across the lake, calling twice. After a long pause, Paige, Grace and the rest of the group exhale together. I sense that their emotional release is tremendous because together they spontaneously describe their impressions about the experience in hushed voices, “That was awesome! Did you hear that owl answer? I’ve never heard an owl for real! Neither have I” (Paige, conversational interview, day two, September 16, 2008). Returning down
the trail in the darkness, we are drawn to the light of the lodges like moths. No one speaks except to whisper hushed good nights and sweet dreams. Nighttime biophilia is awakened, even as children are heading off to slumber.

On Day Three, the last day of Mountain Explorations we gather at the amphitheater. As Bonny introduces the next trail activity, Paige is thoughtfully absorbed drawing in her journal. She looks up and asks for clarification before they play the Human Camera game. Paige and Grace work together. Grace closes her eyes as Paige leads her a short distance down the trail to a vista overlooking the lake. Gently touching Grace’s earlobe, Paige “snaps” a “picture” and Grace opens her eyes to relish and remember the vista of Cathedral and Pyramid Peaks. They trade roles and Grace carefully leads Paige to a low bush and takes a “close-up” shot of dark purple salal berries. Paige and Grace exchange journals and “transfer” their “pictures,” from memory to paper, creating colored pencil drawings on journal pages. Paige appears quite pleased when Grace presents her with a drawing of two snowy peaks. We hoist our backpacks to walk to Deer Creek.

Before we continue down Deer Creek Trail, Bonny prepares her Trail Group for the final all class activity before everyone boards the bus. Paige listens carefully to Bonny who explains, “Later this morning at the closing Fire Circle we will each share an Unselfish Wish and I want you to take some time as we’re hiking this morning to think carefully about your wish.” Several students are unsure about the meaning of an Unselfish Wish, so Paige clarifies her understanding saying to the group:

An unselfish wish is something you wish for others. (Paige, researcher field notes, day three, September 17, 2008)
Bonny tells them that, “All the trail groups will gather around a small fire. Everyone will have a chance to individually share their unselfish wish with their peers at that special time. In the meantime, let’s hike the Diablo Lake Trail to our next activity!”

I can tell Paige likes the description of the next trail activity called Silent Hike because she is suddenly much more animated in her expressions. Bonny goes ahead of the group and every 50 meters along the trail, she carefully places a laminated card on the ground for us to discover and read. To insure solitude, a chaperone releases one child every few minutes. When it is my turn, I walk the trail documenting some of the cards in my field notebook:

- Watch how the light shines through the forest.
- What do you hear?
- Dance, no one is watching!
- What do you think the trees are saying?
- Take a deep breath.
- Describe how this feels.

(Silent Hike Cards, researcher field notes, day three, September 17, 2008)

Perhaps because we are rarely alone in nature, I find the Silent Hike highly evocative and transcendent.

When Paige emerges from her 20-minute solo walk she is smiling serenely. Paige joins her group who are scattered along a sunlit stretch of trail writing Post Cards home and journaling. I reflect in my journal that everyone looks deeply content, settled and peaceful. Paige is gazing steadily into the green forest. As we sit quietly in nature, an hour passes. Sitting and watching the children, I recall David Sobel’s (2008) comment that one transcendent experience in nature is worth a thousand nature facts. I am suddenly glad that we are allowing biophilia to slowly root and grow. Bonny signals with
her hand that it is time to go, but no one budges. Slowly standing, we quietly walk single file to the Fire Circle with Paige in the lead.

At the closing Fire Circle we sing a song called *Roots* in which children add new verses based on the day’s activities. Paige offers, “I am a leaf, rustling in the wind.” When it is time for Paige to add her sprig of cedar to the glowing embers at the center of the fire circle, she offers one of her unselfish wishes to the group smiling:

I wish that everyone could have a good time at Mountain Explorations like me.
(Paige, researcher field notes, day three, September 17, 2008)

*Paige’s Emergent Biophilia*

Paige’s cultural and family background informs her developing biophilia. During our first interview together, Paige reports that she is pleased that at Mountain Explorations children must leave their portable music devices at home. Based on several summer experiences at her grandmother’s hogan in Arizona, Paige expresses the belief that most human technologies simply interfere with her experience of nature. Paige is one of the few students that do not bring a camera to Mountain Explorations.

When I ask Paige during our first conversation together, “So, what are you hoping to see at Mountain Explorations?” she responds with a description of how seeing an animal makes her feel happy:

I want to see more animals because I like animals and I don’t really see animals at home because I haven’t been to a zoo or anything. Or, I might have been when I was small, but I can’t remember it now. Sometimes in the desert, I see an animal, I kind of get happy, like when I see a jackrabbit or anything else, and here like a deer or a bunny. (Paige, Pre-Program interview, September 12, 2008)

Animals evoke in Paige positive emotions. Since Paige does not get a chance to experience nature very often, Mountain Explorations represents a huge opportunity to build her connection with mountain animals.
During our initial interview together, I ask Paige if she has a special place in nature that she likes to go. She replies poetically with a memory of a sunny lake:

Um, I like to be by the lake and some water because I like to see the trees reflection as the sun glares onto the water and seeing the water go down, running through. (Paige, Pre-Program interview, September 12, 2008)

I ask her how she felt looking over the lake and she replies emotively:

I kind of feel like kind of feel more . . . kind of feel . . . I don’t know the word . . . like kind of more alive, because at home there’s all the cars and over there it’s kind of quiet and you can relax. Here at home I don’t get to do that much because I can hear the cars from Bayview Drive. (Paige, Pre-Program interview, September 12, 2008)

For Paige, to talk about nature is to describe how it makes her feel. She reports that she feels more “alive” in nature especially without the distracting automobile noise.

As we talk during the initial interview it becomes clear that Paige’s perception of nature is experiential and emotional. Her memory of a camping trip to the mountains is a reflection of tactile experiences:

Uh yeah, instead of going to swimming pools that put chlorine in, it was kind of fun going into the water that was fresh and you can feel the rocks . . . it feels kind of cool and you can get some rocks that look and feel kind of cool in the water. (Paige, Pre-Program interview, September 12, 2008)

Paige’s descriptions of experiences in nature often trails off into an emotional silence as she reflects on her memory or a special event:

Um, since my family is Native American, sometimes my family comes up here [to the mountains] . . . and sometimes we go on a drive . . . through the mountains . . . [pausing and smiling] so they get some water from the Lake . . . [expansive pause] and they get water. . . and kind of sprinkle it over the sheep [she smiles in conclusion].” (Paige, Pre-Program interview, September 12, 2008)

I am left yearning to know more about this cultural practice of sprinkling water on sheep. I sense its importance through Paige’s halting speech and remote visage. She seems to re-
experience the memory before emerging silently. Smiling toward me, she shifts the
discussion to other experiences in nature.

Paige’s way of learning about nature is validated at Mountain Explorations. By
this I mean that she is encouraged to study the plants and animals of the diverse mountain
ecosystems at a pace that accommodates emotional reflection. The naturalist’s snail-like
pace, the support of Bonny and the focus on journaling allows her to build on her existing
biophilia. Along the trails she has the quiet opportunity to watch wildlife such as jays,
squirrels, ravens, bats, chipmunks, butterflies and deer.

Paige’s actions along the trail reveal her valuing knowledge acquired about nature
through her senses and direct experiences in nature. She builds her cognitive and
emotional knowledge of the forest ecosystem through direct connections with plants and
wildlife along the trails rather than through books. During our Post-Program interview
Paige remembers hiking and reports how she feels on the wilderness trails:

It’s not like here and it doesn’t feel like you’re on a campsite when you’re on the
trails. It feels like you’re really in nature because there are some animals along the
trail. You can see [nature] by yourself. You don’t have a big crowd around you.
There are a lot of trees and open spots with leaves and ferns everywhere. (Paige,
Post-Program interview, September 22, 2008)

Paige acknowledges that the presence of animals along the trail allows her to feel like she
is really in nature. I am reminded that being in nature signifies a type of relationship we
seldom see in children who view nature around them but as a human are separate from
nature.

Paige avoids technology. At the visitor center, when given the option between an
automated map and an animal habitat, Paige moves swiftly toward nature. To record her
experiences, she favors journals over cameras. Paige avoids noisy roads and prefers quiet
places. Watching Paige move across the natural landscape thoughtfully and attentively, I realize that noise interferes with her ability to easily hear and make connections with animals. Paige loves nature and is singularly present when she is outside in the presence of another animal.

It is significant that her camera came back with only a few pictures. There are no pictures of the waterfall even though it is one of the highlights of Mountain Explorations. This evidence suggests to me that Paige’s focus is not on “capturing” nature to share with someone as a future event. Instead, she prefers to experience nature directly in the present. Journaling and the Human Camera activity allows her to connect with nature while electronic cameras interfere with Paige’s ability to feel nature.

At Mountain Explorations, Paige is part of a community that values being in nature. She freely shares her observations of animals with her trail mates who also love animals. While participating in Mountain Explorations, Paige has been encouraged to reflect on her experiences in nature. Already strongly biophilic, her experiences at Mountain Explorations allow her to expand her love of living things to mountain ecosystems. Rarely effervescent in her expressions, Paige’s Unselfish Wish is a reflection of how much she values her time in the wilderness of Mountain Explorations. Her Unselfish Wish to share the Mountain Explorations experience with everyone epitomizes her generous biophilic attitude. She wants everyone to have a chance to connect with nature. During our Post-Program interview together she reports that she has another unselfish wish, which she did not share at the closing circle, “I wish everybody could see the animal they want to see” (Paige, Post-Program interview, September 22, 2008).
Paige’s written and verbal responses create an image of a young girl longing for animals and quiet connection to nature. During the last day at Mountain Explorations, children reflect on their program experiences by writing a Post Card addressed to Dear Me. Surrounded by green, sitting in a sun-dappled trail, Paige chooses a Douglas fir card and writes herself the following note:

Dear Me,
I really enjoyed the Silent Hike just now. My favorite time at Mountain Explorations was when we first made it onto the trail! My favorite trail was the Peninsula Trail and the Sourdough Trail, which I am on now. I hope you remember how much fun you had here! The animals are awesome!
(Paige, Post Card, day three, September 17, 2008)

Paige’s experiences in the high county desert with her family in Arizona may have predisposed her to value reflective time in natural settings. Though Paige specifically mentions time with her grandmother as influential to her perception and value of nature, we are left wondering how deeply this experience affects her relationship in nature. As we walk to the bus for the trip home, Paige tells me that she is looking forward to bringing her mom and dad up to Mountain Explorations to explore the trails and maybe experience the Silent Hike. When she considers the cost of gas, she decides to try a Silent Hike with her mom in the woods by her apartment (Paige, conversational interview, day three, September 17, 2008). I was pleased that she wants to share Mountain Explorations and nature with her family members. For Paige, the Silent Hike represents one of the best ways to experience nature. Her deepest biophilia is expressed silently, emotionally and reflectively. Her biophilia has grown from the Southwest deserts and lowland forests to embrace the mountain wilderness of the North Cascades.
Researcher Reflections

The Mountain Exploration experiences of Anthony, Carmen, and Paige provide an in-depth look at different ways that children express biophilia in action in response to the Mountain Explorations program. Each of the children’s stories demonstrates different aspects and expressions of biophilia. Anthony’s story illustrates that nature as a threatening place can transition to a place of respect, care and learning. Carmen’s story shows how nature can be a place of rich interconnections and learning that leads to expanded expressions of biophilia. Paige’s story shows that nature can exist as a site for reflection and expression of native biophilia.

Current research on effective environmental education advocates the importance of deepening children’s love and affiliation with nature (Kahn, 1999, 2002; Kellert, 1997, 2002; Louv, 2005; Pyle, 2002; Sobel, 2008) and is critical of the current knowledge-attitude-behavior model (Elder, 2003) that may simply raise awareness of environmental problems but not change children’s developing values (Gurevitz, 2000). Experiential field-based programs that focus on more affective or emotional/experiential knowledge are more likely to change children’s perceptions and values of nature (Gurevitz, 2000; Hart & Nolan, 1999; Kellert, 2002; Nabhan & Trimble, 1994). Preliminary research suggests that when children forge an affective relationship with nature through knowledge, bonding and intimacy with an animal, plant or landscape they can engender feelings of love (Gurevitz, 2000; Kellert & Farnham, 2002; Wilson, 2005). Gurevitz claims that there has been relatively little work to investigate how children value and experience their environments.
The children’s stories presented here support and contribute to discourse in this area and provide evidence of the potential of environmental education in outdoor settings in fostering rich biophilic expression. My analysis of children’s experiences in Mountain Explorations suggests that progression to biophilia is not linear. As illustrated in Figure 6.1, taken together the program elements create a cycle that strengthens and cultivates children’s biophilia. Depending on the initial degree of biophilia, the loop may be entered in any position. Also, the cycle may be repeated with other types of wilderness experiences.

Figure 6.1 Mountain Explorations Program Cycle Leading to Biophilia

Research suggests that wilderness experiences (i.e., outdoor education and environmental education) amplify people’s emotional responses by providing authentic challenge in extreme environments (Suedfeld, 1991), outstanding aesthetic experiences
and access to living diversity (Greenway, 1996). The wilderness setting of Mountain Explorations appears to be important to children’s biophilic growth because they experience real mountains with steep trails, pristine streams, green diversity and charismatic predators. The natural attributes of the wilderness – its challenge, grandness, beauty, and diversity – seem to engage children’s imaginations and amplify their emotional investment in nature study.

In the case of Mountain Explorations, particular activities and events were significant in supporting the growth of biophilia. The Forest Food Chain activities provided children with an understanding and working knowledge of the basic relationships among producers, consumers and decomposers. Carmen embraced the idea the interconnectedness of the forest food chains by drawing a picture of a girl investigating a tree/fungus association and later adding a second food chain representing a tree/goshawk/squirrel/worms/bugs interaction.

The Night Hike provided a space for calm, inward reflection. Children encountered and faced their hesitancies about the night and the wilderness as they contemplated bats, stars, planets and night sounds. Paige heard her first owl. Carmen realized that bats live in the mountains and that our sun was one of many stars. Anthony, the self-proclaimed city kid, faced his fear of bears and grew in confidence. For Anthony, the Night Hike was an initiation experience. For many children hiking in the darkness was transformative and one of their favorite experiences at Mountain Explorations.

The Web of Life activity built on children’s initial understandings of forest food chains as they experienced how parts of an ecosystem are connected through a vicarious, hands-on demonstration. Being outside immersed in the wilderness allowed children to
build an authentic web of life with components that could be seen, touched, heard and studied. After seeing an actual deer feeding in the forest that morning, Paige creatively learned to weave a relationship between the sun, deer and salal in which the deer enjoyed the shade and nibbled the leaves of salal. Alternatively, Anthony and Carmen both explored the relationships between bears and plants. They were shocked and noticeably relieved to learn that bears are omnivores that prefer eating vegetation (producers) and insects (consumers) rather than big animals like humans. Their interest in learning about the feeding habits of bears was heightened because at Mountain Explorations they inhabited the same wilderness as the bears. Understanding these forest relationships is a basic building block for the development of biophilia during Mountain Explorations.

The All Day Hike stretched children physically and emotionally. However, it was aesthetically quite rewarding and a real accomplishment for Paige, Carmen and Anthony to hike several kilometers carrying a daypack with food, water, sweater, raincoat and journal. The sheer magnitude of the beautiful wilderness seemed to amplify children’s expectations and responses. Educational activities along the trail like Each One Teach One – that encouraged children to form an intimate relationship with a forest plant by teaching about it – were interspersed throughout the day. These activities were repeated during the long hike to create a cycle of physical, cognitive and emotional responses throughout the day. When children reached the icy Sourdough Waterfall, they dunked their heads in glacial blue water screaming and splashing in singular enjoyment of nature. They relished the vistas and reflected on their experiences through Nature Writing in journals. For these children, the All Day Hike was biophilia in action. They were
beginning to love the water, plants, animals, vistas and landscapes of the North Cascades Mountains.

Whereas the All Day Hike required strenuous physical effort and an outpouring of energy on the part of children, the Silent Hike provided children a safe place to experience nature inwardly alone. The children were free to be children in the wilderness. They were encouraged to look, listen, notice, act like a monkey and dance on a sun-dappled trail. The pace was purposely slow to accommodate emotional reflection. For Paige the Silent Hike was her favorite activity at Mountain Explorations. Perhaps because she had achieved a deep sense of peacefulness and connection to nature along the Sourdough Trail, Paige was eager to bring her mom and dad to the mountains to share the Silent Hike. During the Silent Hike, Carmen and Anthony also achieved an inner calm and connectedness to their surroundings. After the hike, they contentedly sat in the forest with their Trail group, submerged in the green leafy canopy, for over an hour. Writing in their journals and reflecting on the wilderness they calmly loved nature.

The Nature Writing activities enabled children to combine their knowledge and feelings together in the form of written words. It provided Carmen, Paige and Anthony deep access to their creative thinking processes as they composed poetry about animals, plants and landscapes of the North Cascades. They inscribed beautiful biophilic expressions in their journals as they nestled deep in the green forest. As I watch the children in the forest, an image of a growing tree comes to mind with roots creating a physical connection to the earth while environmental knowledge, aesthetic appreciation, and emotional responsiveness compose the growing tree trunk and branches of the tree. The four components blend together to support biophilic growth. The interplay of
ecosystem knowledge and emotional connection to the plants, animals and landscapes helped cultivate beautiful creative expressions of biophilia that are rooted to the earth.

The stories of Anthony, Carmen and Paige and the vignettes and table data from the previous two chapters show that the Mountain Explorations experiences enhanced children’s environmental knowledge, emotional responsiveness, physical connectedness, and aesthetic appreciation of nature. As they participated in Mountain Explorations, children’s cognitive, emotional, ethical, moral and physical connections and understandings of the wilderness grew. Showing steady growth in biophilia, children expressed a range of environmental values and extended their expressions of these values through their participation in the Mountain Explorations.
CHAPTER SEVEN
SUMMARY, IMPLICATIONS, FUTURE DIRECTIONS, AND CONCLUSIONS

This study examines children’s connection to the natural world and expressions of biophilia in the wilderness of the North Cascades Mountains. I researched how children perceive nature and the ways in which Mountain Explorations activities changed children’s expressions of biophilia. My analysis of the children’s engagement in and responses to the Mountain Explorations program indicated that children gained knowledge of the forest ecosystems, formed connections with the plants and animals of Cascadia and most significantly cultivated feelings of love, care and respect for the forest ecosystem. My analysis of three children’s Mountain Explorations stories revealed that their program experiences informed and deepened their biophilic expressions.

In this chapter, I summarize the findings of my research by returning to the two questions that guide my doctoral study:

1. What are children’s perceptions and experiences in nature?
2. What types of experiences with nature support the development of biophilia in children?

I also discuss the implications of my study findings and make suggestions for further research.

Summary

To understand children’s biophilic experiences, I accompanied two elementary classes of grade 5 students as they participated in Mountain Explorations, a wilderness-based residential environmental education program in the North Cascade Mountains. The
children participated in three days of structured environmental education activities and
wilderness hikes conducted during the day, evening and night hours. I examined how
children’s connection to the natural world changes through their participation in a
wilderness-based environmental education program by analyzing interview, observation
and document data. In addition to considering the experiences of 35 children, I also
examined the cases of three individual children to provide an in depth look into children’s
experiences in nature at Mountain Explorations. This study illuminated how biophilia
emerges with experience and expansion of environmental knowledge, emotional
responsiveness, aesthetic appreciation, and physical connectedness. My findings are
presented below.

**Research Question 1: What are children’s perceptions and experiences in nature?**

Children perceive nature through a variety of experiential lenses. One lens is
cognitive, where nature is experienced as a place of learning. Another lens is aesthetic
and emotional, where children perceive the beauty of the living world and create
emotional bonds to nature. Another lens is physical, as children experience nature
through multisensory dimensions. A final lens is reflective, where nature is perceived as a
site for reflection and contemplation.

Children’s view of nature through a cognitive lens allows them to make
observations, detect patterns and understand interconnections in nature. Prior to attending
Mountain Explorations, most of the children’s perceptions of nature were based on
observations and their responses showed limited ecological understanding as indicated by
the absence of discussion or explanations concerning the interconnections between
components of the environment. This finding supports claims by environmental researchers and writers that children lack understanding of the natural world (Chawla, 1999; Kellert, 2002; Kuo, 2003; Louv, 2005; Malone & Tranter, 2003; Pyle, 2002; Rivkin, 1995; White, 2009).

Through experiences at Mountain Explorations, children’s empirical and objective knowledge of the natural world increased noticeably. Growth in scientific knowledge and valuing was augmented by children’s growing awareness of the interconnections within and among organisms in the wilderness ecosystems that they studied. Most significant to this study of biophilia, as children progressed through the Mountain Explorations program, making discoveries and connections to the natural world, their responses to nature became increasingly ecological, emotional and aesthetic.

During the Mountain Explorations program, children loved to learn the names of things as they built a framework and taxonomy of the natural world. Children eagerly built an ecological understanding as they engaged in experiences that provided first-hand experience with the interconnections inherent in nature. Children came to perceive nature as a place to make observations of plants and animals and develop empirical knowledge of the natural world. As children explored, played, hiked and made discoveries, they began to perceive nature as diverse, green, living and interconnected. Through these experiences, children came to perceive nature as something compelling, alluring and interesting.

Children’s view of nature through an aesthetic/emotional lens allows children to develop enduring bonds with nature. Prior to attending Mountain Explorations, children’s minimal exposure to nature limited their aesthetic and emotional responses. Most
children described nature dispassionately in terms of simple objective descriptions of animals and plants. At the start of the study very few children, Paige being one of the exceptions, viewed nature through an affective lens, describing nature in terms of how it made them feel. About a third of the children in this study initially expressed negative emotional responses to nature based on fear of heights, weather, plants, animals, the dark, getting lost and strangers. This finding supports research that children fear the natural world (Pyle, 2002; Sobel, 2008). During the program, children’s aesthetic/emotional expressions increased as children made strong emotional attachments with nature. Children simply loved nature at Mountain Explorations.

From the moment children arrived at the Learning Center, their words and actions suggested that they were drawn into the green diversity of the forest, inspired by the grand mountainous vista’s and delighted by the animals. Involvement in the program fostered qualitative decrease in children’s negative feelings toward nature particularly wild animals, heights and the dark. As children’s fears diminished, their biophilic expressions increased.

During Mountain Explorations nature often evoked strong aesthetic and emotional responses in children. I found that large reclusive animals including charismatic megafauna like bears, cougars, deer and wolves elicited aesthetic, emotional and poetic responses in children. My data suggests that small animals also captivated children at Mountain Explorations. Children’s aesthetic responses also extended to the mountainous landscape.

During Mountain Explorations, nature experiences provided the inspiration for biophilic expressions representing a growing bond between children and nature. For
example, I noticed children’s emotional connection to nature deepen during the night hike as their experiential responses included emotive words such as love, amazing and awesome. Children’s responses show how direct experience in the nature can be transformative. Hiking trails, making first-hand observations of animals, discovering animal signs and reflecting deeply in nature can be life changing for children allowing them to discover or renew a strong emotional attachment and love of nature.

Children view the physical space and landscape of nature as a place for physical exertion and recreational challenge but also a quiet relaxing site for personal contemplation. Prior to the program, most children indicated that they liked to play outside, but nature merely served as a backdrop to their recreational activities. Most children had limited hiking, outdoor swimming and camping experiences in nature or wilderness. Significantly, only eight children reported that they had participated in nature dependent activities like hiking that might promote biophilic appreciation of nature. Initially, the children in this study had little primary experience in nature and thus their physical perceptions of nature’s landscapes were similarly limited. Most had never experienced the pristine mountains and forests.

During Mountain Explorations, children came to perceive nature as a place where they could challenge themselves, exert themselves physically and be rewarded with breath-taking views. During the program, children commented on how the North Cascade Mountains were steep but more accessible than previously imagined. Children also perceived nature as a place for first-hand multisensory experiences that allowed children to develop and deepen their relationships with nature. Children also enjoyed the physical relaxation and release of lounging on a trail surrounded by verdant plants.
Children’s view of nature through a contemplative lens allows them to reflect quietly and bond with nature. Prior to the program nearly half of the children read, walked and reflected outdoors. A few children had a special place near their homes, often in their yards, where they went to be alone and reflect. Most had done this without explicitly focusing on their physical surroundings. During Mountain Explorations, children became more aware and connected to outdoor places. They wrote and reflected in nature as part of the daily learning activities. As children hiked in aesthetic places and experienced educational trail activities that stimulated discovery, they also came to expect time for reflection. Reflection and discovery in beautiful locations led to strong and long-lasting emotional connections with nature.

Research Question 2: What types of experiences with nature support the development of biophilia in children?

Most children in this study had limited exposure to nature for either play or study before attending Mountain Explorations. They were enthusiastic, excited about, mystified by, and somewhat frightened by the prospect of an adventure in wilderness setting. But through their words and actions there was little evidence of the strong emotional connections to nature indicative of biophilia. Over the three days in Mountain Explorations that changed. Through their conversations, writing, and actions children learned to love the natural environment. My findings suggest that certain types of experiences appeared to promote biophilia in children.
Learning experiences that help children understand the intricate connections and dependencies between ecosystems and provide children with an understanding and working knowledge of the basic relationships within ecosystems help cultivate biophilia.

For example, The Forest Food Chain activities provided children with an understanding and working knowledge of the basic relationships among producers, consumers and decomposers in the forest ecosystem. Children studied lichens, mosses, leaves and insects with microscopes and hand-lenses and hands-on activities along the trail. Incrementally they learned to differentiate biotic components by their role in the ecosystem. The Forest Food Chain activities challenged children to make meaningful connections between forest plants and the natural environments. Carmen embraced the interconnectedness of the forest ecosystem by drawing a picture of a girl investigating a complex interaction between a tree, fungus, goshawk, squirrel, worms and bugs.

The Web of Life experiences helped children understand the intricate connections and dependencies between ecosystem members in the wilderness. Being outside, immersed in the startling green biologically diverse forest, allowed children to build an authentic web of life with components that could be studied first-hand along the wilderness trails. After seeing an actual deer feeding in the forest that morning, Paige creatively learned to weave a relationship between the sun, deer and salal in which the deer enjoyed the shade and nibbled the leaves of salal. Alternatively, Anthony and Carmen both explored the relationships between bears and plants. They were shocked and noticeably relieved to learn that bears are omnivores that prefer eating vegetation (producers) and insects (consumers) rather than big animals like humans. Their interest in learning about the feeding habits of bears was heightened because at Mountain
Explorations they inhabited the same wilderness as the bears. Understanding these forest relationships is a basic building block for the development of biophilia during Mountain Explorations.

Through the Each One Teach One experience, the children forged a connection with the native plant community by teaching each other about trailside plants. This activity helped to build children’s ecosystem knowledge and confidence as they autonomously shared their special plant and ethnobotanical knowledge with peers. Children also began to see that plants exist in interrelated communities that help define the North Cascades ecosystem. Through extension, they came to realize that plant communities exist within their home communities, sometimes right outside their schools. Children grew in their biophilic expression as they interpreted and shared an intimate story about some facet of nature with their peers.

Aesthetic and emotional rich experiences evoked biophilia in children. The darkness and quiet experienced during the Night Hike provided a space for calm, inward reflection and biophilic transformation. Children encountered and faced their hesitancies about the night and the wilderness as they contemplated and made connections with bats, stars, planets and night sounds. Carmen realized that bats live in the mountains and that our sun was one of many stars. Paige heard her first Barred Owl. For Anthony, the self-proclaimed city kid, the Night Hike was an initiation as he faced his fear of bears and grew in confidence. Hiking in the darkness was transformative for most children and one of their favorite and most memorable experiences at Mountain Explorations.

The Silent Hike provided children with a capstone wilderness experience by providing a safe place to experience nature reflectively, inwardly and alone. Carmen and
Anthony achieved an inner calm and connectedness to their surroundings and Paige described the Silent Hike as a wonderful activity at Mountain Explorations. The slower naturalist’s pace accommodated deep emotional reflection on a familiar trail and the vastness of wilderness setting accentuated the significance of the transformative event – they were truly alone.

Physically demanding or challenging experiences in nature can provide children with a sense of accomplishment that can amplify the aesthetic and emotional rewards and promote biophilia. For example, the strenuous All Day Hike stretched children physically and emotionally. However, it was aesthetically quite rewarding and a real accomplishment for all children to hike several kilometers carrying a daypack with food, water, sweater, raincoat and journal. The sheer magnitude of the beautiful wilderness seemed to amplify children’s expectations and responses. For instance, when children reached the waterfall overlook, they expressed elation at the beautiful vistas.

Reflection Experiences that provide children a site for deep reflection and contemplation centered on nature help build emotional connection to nature and biophilia. Immersed in a luxuriant green forest, children cultivated new feelings and emotions as they sat quietly, contemplated their surroundings, and reflected and wrote creatively in their journals about nature. The wilderness setting allowed children to experience nature directly with all their senses and build close relationships with the plants and animals of the North Cascade Mountains. As children experienced the forest diversity directly, their reflective activities helped them develop more intimate emotional responsiveness to the plants and animals that form the Cascadia ecosystem. For example, Nature Writing provided children a site for deep thinking centered on nature. Journaling
enabled children to combine their knowledge and feelings together in the form of written words as stories, poems, illustrations and art. Writing quietly in nature, provided Carmen, Paige and Anthony access to their creative thinking processes as they composed poetry and stories about animals, plants and landscapes of the North Cascades. The interplay of ecosystem knowledge and emotional connection to the plants, animals and landscapes, helped cultivate beautiful creative expressions of biophilia.

**Emergent Issues**

This thesis focused on two questions that examined children’s environmental education experiences and their biophilic responses to nature. During this research, some issues emerged that warrant further consideration. One such emergent issue concerns “native” biophilia expressed by Paige at Mountain Explorations. I observed that watching animals in the wilderness enthralled Paige. For Paige, nature was more complete when animals were present along the trails, “It feels like you’re really in nature because there are some animals along the trail” (Paige, Post-Program interview, September 22, 2008). Her observations of a chipmunk, butterfly, ravens and a jay absorbed her fullest attention and often left her smiling long after the animal was gone, and long after other children had moved on to something else.

Nelson (1983, 1989) argues that our interpretation of biophilia should be enlarged, and indicates that for some indigenous peoples, the human need to affiliate with life is complemented by plants, animals and the rest of life emanating a reciprocal need to affiliate with humans. Nelson’s understanding of “native” biophilia is based largely on the Koyukon worldview and an appreciation of human’s hunter-gatherer origins. Suggesting a *symbiotic* relationship with life, the Koyukon are part of a living/learning
community that includes the land as well as the plants and animals (Kahn, 1997). The Koyukon’s sensitivity and attunement with nature emphasizes interconnectedness, commitment to family, community, and culture, and a connection with place that is passed down through the generations.

Paige preferentially engaged with real nature rather than turning to books like field guides, or taking pictures. I noticed that she paused, lingered, and moved slowly, as she connected with animals as if her biophilia was simmering. During this study I wondered to what degree Paige’s biophilia, expressed silently, emotionally and reflectively, was a reflection of her experiences and connections with her Navajo family and indigenous communities of the high country desert of Arizona. Paige specifically mentions time with her mother and grandmother as influential to her perception and value of nature. Paige’s story is suggestive that some Native American children, e.g., those who have strong identities with their culture, may have notions of nature that have been passed down through the generations. The concept of native biophilia points to a rich area for future study.

Another emergent issue that warrants further discussion concerns children’s biophobia. Although every child in this study expressed positive feelings toward selective aspects of nature, some also demonstrated negative emotions. These negative feelings such as fear and aversion are an important part of our relationship with the natural world. My findings suggest that while most children have a favorable perception of nature, a few have phobias related to predators, weather, heights, insects, and strangers. My findings suggest that negativistic views of nature can be diminished when children participate in positive experiences in the wilderness during environmental education activities. Since
these fears can provide a barrier to children’s affiliation with the natural world, they provide an important consideration for future research as well as for practitioners who are designing programs for children.

During my study, as I documented children’s broad range of emotional responses to nature that included enjoyment, happiness, joy, interest and anticipation and negative emotional responses such as fear and threat, I noticed that at times children seemed to be particularly “tuned in” to nature. These were times when children were so immersed and apparently focused on nature that they were unaware of time passing. Although it was not one of my study objectives, I observed and felt compelled to document in my field notes these moments because they seemed to capture what has been termed “flow.”

Based on over twenty years of research with accomplished individuals (musicians, composers and surgeons), Csikszentmihalyi (1990) and colleagues noted that subjects involved in demanding and intrinsically rewarding activities routinely reported a sense of “flow” in consciousness during peak experiences. Flow requires total focused concentration, a merging of action and awareness, loss of awareness and a temporal distortion (Nakamura & Csikszentmihalyi, 2002).

My initial observations of children experiencing nature in wild settings suggest that children occasionally experience nature as a peak experience, merging action and awareness and losing their sense of time. Although Csikszentmihalyi’s theory of flow has been applied to a number of wilderness activities such as climbing and skiing, the theory has not been applied to environmental education and biophilia (E. Myers, personal communication, May 7, 2008). Flow might provide a conceptual framework to
understand the dynamics of biophilia, such as when children are completely absorbed in intrinsically rewarding nature study. This points to a rich area for future research.

Something else that I wish to comment on but did not study directly is the role of the program provider. My observations suggest that those individuals who introduce children to nature such as trail leaders have a significant influence on children’s affiliation with nature. As trail leaders introduce experiential learning activities they can constrain and enhance children’s biophilia. Trail leaders have a key role in helping to set a positive attitude for observation and inquiry in nature. For example, as Carmen applied her knowledge of animal tracks to identify the animal scratches on the tree, her trail leader cultivated her curiosity through supportive questioning strategies. Trail leaders also help establish a safe learning environment where questions are encouraged. The manner in which they respond to children’s questions can help establish a safe and intrinsically motivating learning community. Trail leaders also establish the pace of learning and provide dedicated time and a safe structure for contemplation and reflection. Thus, the role of trail leaders in supporting children’s positive affiliation with nature represents a key area for future research.

Another emergent issue for discussion concerns the tension between cognitive and affective elements in environmental education. Gurevitz (2000) contrasts the dominance of scientific or cognitive knowledge in environmental education with the arguments that support a greater focus on affective or emotional/experiential knowledge. She provides evidence that knowledge-based approaches may simply raise awareness of environmental issues but not change deeply held values. Her research suggests that affective approaches are more likely to change children’s perceptions and values. However, she concludes that
there has been relatively little empirical work that investigates how children value and experience nature environments. Her arguments inform my study and illustrate the importance of engaging in research that involves *listening* to children *in* and *with* nature. In undertaking such a study, the researcher needs to set aside preconceived notions and adultist assumptions to open oneself to the everyday world of the children.

A final issue for consideration centers on the use of cameras by children. I noticed that cameras seemed to both focus and constrain children’s naturalistic inquiries. I observed that children with cameras at first focused everywhere and nowhere. For instance, cameras initially appeared to help some children momentarily focus their observations on novel species or visually aesthetic objects and vistas. However, trail leaders reported that cameras interfered with their instruction by distracting the children who were eager to capture nature digitally. Camera use sometimes displaced journaling as a means to record or capture a nature experience. Eventually, as the children depleted their film, batteries and memory, they became more discriminating in what they chose to photograph. Toward the middle of the program, when the cameras were put away, I observed that children’s hands were finally free, and they began to touch and interact with nature in new ways. Without cameras, children expanded their naturalistic inquiry to encompass multisensory ways of knowing, as they explored through hearing, touching and smelling nature. My findings, which are tentative and very preliminary, suggest that a more purposeful use of cameras in the field could benefit both students and practitioners by reducing distraction and directing focus on program goals.
Implications for Practice and Research in Environmental Programs

This study has implications for the diverse fields of environmental education, conservation psychology\(^5\), positive psychology and science education as the findings link the positive experiences of children in nature to environmental education theory and practice. My research provides empirical evidence of the kinds of multi-disciplinary and interdisciplinary experiences in wilderness that cultivate children’s biophilia. This study also reveals the advantages and limitations of adopting a value’s typology for the study of biophilia.

My research reveals that environmental education programs may benefit from incorporating wilderness experiences that enhance biophilic expressions in children. The shear magnitude and diversity of wilderness seems to amplify children’s expectations and biophilic growth. Since children in this study lived mostly in urban environments, the Mountain Explorations program provided many children with their first sustained connection with relatively pristine wilderness – a nature that is simple and largely free of recent human intrusion. The incorporation of wilderness field experiences must be done thoughtfully however because there are barriers to children’s biophilia. For instance, children’s fear of predators and heights can interfere with their positive emotional response to nature.

Hart and Nolen (1999) identify ‘student thinking’ and ‘children’s ideas’ as two neglected but developing foci within environmental education research. This emerging research area, focused on the “student,” is predominately qualitative. Rickinson (2001) states that

\(^5\) The new field of conservation psychology focuses on the “study of the reciprocal relationships between humans and the rest of nature, with a particular focus on how to encourage conservation of the natural world” (Brookfield, 2008).
proposes that most environmental education researchers and program tend to view the student as passive. Therefore, the researcher’s quest to understand students’ environmental thinking usually culminates simply in recommendations for the creation of new educational interventions that are imposed on the submissive student. These interventions are designed to “fix” the child’s knowledge or understanding. In this view of education, the reciprocal nature of learner and teacher is underemphasized.

Rather than offer another fix, this study offers insights into biophilia in action that could benefit researchers and practitioners interested in designing and implementing multi-disciplinary environmental education curricula. My findings on the impact of Mountain Explorations experience may encourage educators to use biophilia as a framework to develop multi-disciplinary and interdisciplinary environmental education in wilderness and non-wilderness settings. This study may also assist nature centers, environmental learning agencies and other institutions that wish to develop new environmental education programs that emphasis children’s affiliation with nature.

My research also shows that biophilia occurs through concurrent cognitive and emotional development. The study underscores the importance of emotionally rich experiences in nature that have the transformative power to strengthen children’s deep affection for nature. By examining how children incorporate the scary, mysterious and sublime in nature this study helps elucidate what it means to “unlock” and cultivate biophilia.

With the growing anthropogenic pressures on the earth’s biotic communities and our increasing concern over children’s diminishing affiliation with nature (Louv, 2005), it is now essential that researchers and practitioners embrace a comprehensive educational
transformation that is attentive to biophilia. This study documents how children build attachments, empathy, caring and aesthetic appreciation of nature through discovery experiences in a wilderness. Insights gleaned from my study may also assist nature centers, environmental learning centers and other institutions that wish to develop new environmental education programs that emphasize children’s affiliation with nature.

As I investigated children’s perceptions of nature, my use of Kellert’s typology of nine values as a frame of analysis for children’s expressions of biophilia revealed merits and limitations of the typology. The nine values provided a vital structure for my investigation of a wide variety of children’s biophilic expressions and resulted in a rich analysis of children’s affiliation with nature in a wilderness. The typology helped me recognize and reflect on children’s biophilic tendencies to associate with the natural world.

One limitation of the typology that emerged during my study of children’s expressions of environmental values centered on children’s strong physical association with nature. I observed that children reveled in the physical challenges associated with mountain trails. The steep switchbacks and long distances afforded appropriate and satisfying physical challenges for grade 5 children. This love of the physical challenge was not appropriately reflected in Kellert’s typology of environmental values - yet seemed to be an important aspect of children’s biophilic response.

Children also took great pleasure in simple and deep immersion in the diverse green forest. For example, while resting at trailside, surrounded by verdant bracken ferns, brushing against evergreen salal and feeling the twinkling cascade of green vine maple leaves, children experienced the living green diversity both physically and aesthetically.
At these times children seemed enraptured, completely absorbed in the immediacy of the experience; engrossed in nature and enthralled physically, emotionally and cognitively by the green life. These rapt encounters with diversity do not fit easily into one value category, they are simply too holistic. Thus, representing this more holistic biophilic experience was not possible using Kellert’s typology. This indicates another limitation of adopting Kellert’s (or any other) typology as a single frame of analysis in the study of a phenomenon as complex as biophilia.

**Future Directions**

While this study offers a qualitative look at children’s perceptions of nature and evidence that a multi-disciplinary residential environmental education program can inform and cultivate biophilia, there are issues that merit further investigation. One area that requires further study is the manner in which indigenous learners like Paige form an affiliation with nature. This type of scholarship would involve studying children’s family and cultural background and how these impact perceptions and experiences in nature. Since researchers claim that indigenous children have different ways of knowing the world (Barnhardt & Kawwagley, 2005; Cajete, 2000; Hansen & Van Fleet, 2003; Nelson, 1983; Snively, et al., 2001), it is quite likely that biophilia is perceived in many ways. Research involving indigenous learners with local tribal affiliation would add an interesting place-based dimension to studies of indigenous biophilia. For instance, indigenous learners from the Lummi Tribal School in Washington State may have cultural traditions that link biophilia directly to Cascadia.

As discussed previously, another area for further research involves children’s biophobia. While most children have a favorable perception of nature, a few have
developed phobias for nature or parts of nature such as plants or animals. My findings suggest that these fears are often based on anecdotal information rather than authentic experience in nature. Since these fears provide a barrier to children’s affiliation with the natural world, biophobia is an important consideration for investigation.

Another area for future study is Csikszentmihalyi’s theory of flow. Flow is well documented in some wilderness activities such as climbing and skiing but has not been applied to nature study or environmental education. Flow could provide a lens to investigate the dynamics of biophilia in action, as children become absorbed in intrinsically rewarding nature study.

Further research is needed to understand the role of the program provider in supporting children to develop their own affiliation with nature. Teachers are influential in all settings. In their role as leaders and teachers, environmental education program providers can influence the learning environment in significant ways by defining safe boundaries for learning, modeling respect for nature, establishing an optimal pace for learning in nature and helping children grapple with their phobias. Since program providers have a significant influence on children’s inclination to affiliate with the natural world, their changing and varied role would be important to investigate.

On a personal level, by emphasizing the conditions that support the self-construction of biophilia, I hope to assist in establishing more clearly the relevance of biophilia to the general principles of wise planetary citizenship. To achieve this, a few scholars call for an entirely new educational paradigm that reconceptualizes the schooling enterprise in terms of sustainability and place-based understanding (Bowers, 1999; Gruenwald, 2003; Orr, 1996). These scholars claim that education for sustainability
demands a new kind of citizen, not just new kinds of workers (V. Nolet personal communication, January 25, 2009). Research is needed to understand this proposition and how education can contribute to the development of such a citizenry. My research with school-aged children suggests that by shifting emphasis back toward a heartfelt affiliation for life and a love affair with the natural world through nature study, we can promote a more fruitful union between humans and their environment. This is a good place to begin but further research is needed.

Conclusions

This study examined how children’s participation in an environmental education program cultivates and enhances children’s connection and affiliation to the natural world in the wilderness of North Cascades Mountains. Through engagement in activities such as Forest Food Chains, Web of Life, Each One Teach One, Nature Writing and wilderness hikes such as the Night Hike, All Day Hike and Silent Hike, the children related deeply with the natural world. Children formed connections with the plants and animals of Cascadia and most significantly cultivated emotional feelings of love, care and respect for the forest ecosystem including charismatic fauna like bears, squirrels and birds.

Children expressed a range of environmental values and extended their expressions of these values through their participation in the program. My data indicated increases in children’s aesthetic, humanistic, moralistic, symbolic, naturalistic and scientific-ecological valuing of nature and a corresponding decrease in negativistic views. In general, as children experienced the beauty and diverse ecosystems of the mountain wilderness their fears lessened and their biophilic tendencies grew.
My analysis of three children’s stories revealed that the wilderness experiences of the Mountain Explorations program informed and deepened their biophilic expressions. My research shows that children’s capacity to connect with nature, physically, cognitively and emotionally, grew. Mountain Explorations enhanced children’s environmental knowledge, emotional responsiveness, physical connectedness, and aesthetic appreciation of nature.

John Burroughs (2000) cautioned that, "Knowledge without love will not stick. But if love comes first, knowledge is sure to follow." My findings from this study support the view that biophilia is cultivated through the blended growth of environmental knowledge, emotional responsiveness, physical connectedness, and aesthetic appreciation of nature.
REFERENCES


nature: Psychological, sociocultural, and evolutionary investigations (pp. 117-152). Cambridge: MIT Press.


APPENDICES

Appendix A: Interview Questions

Pre-Mountain Explorations Interview Script (semi-structured interview format)

Introduce myself as a graduate student at UBC and discuss the student assent form.

Remind the participants that participation is voluntary and they are free to decline to answer any questions or to stop the interview at any time. As much as possible I want the interview to be a conversation.

1. To stimulate conversation: Share something about your neighborhood, your yard, playing outside or family trips.

2. What is nature to you?
   a. What do you think of when I say the word nature?
   b. When you look in a forest what do you see?

3. When you are outside in nature, what do you like to do?
   a. What else do you like to do in nature?
      (Possible responses include: exploring, listening to birds, looking for deer, building forts and tree shelters, watching butterflies, hunting or fishing)

4. When you the leave the city and go into the countryside, how do things change around you.
   a. How is nature different from human-made places?
   b. How is nature the same as human-made places?

5. Describe your favorite place in nature.
   a. Why is it your favorite place in nature?
b. What is your favorite thing to do in your special place?

c. What do you do when you are by yourself in nature?

d. What do you do with others in nature?

e. How does your special place make you feel?

   i. Why does it make you feel ____________?

f. Is nature ever a scary place for you?

6. Is a zoo different from nature?

7. Can you find nature in your neighborhood?

8. How does nature change?

   a. Seasonally? Yearly? Longer?

   b. Imagine your favorite nature setting – have you seen it change change?

   c. Can anything destroy nature or does it always stay the same?

9. Have you been to a day camp or overnight camp before?

   a. A lot – some - never

   b. What kind of activities did you do at camp?

   c. What is the best experience?

   d. What is the scariest?

10. Have you gone hiking before?

   a. A lot – some – never

   b. What is your favorite part of hiking?

11. Have you gone camping before?

   a. A lot – some – never

   b. What is your favorite part of camping?
12. Have you been to the mountains before?
   a. A lot – some – never
   b. What is your favorite memory of the mountains?

13. Tell me what you know about Mountain Explorations.
   a. What do you hope to see at Mountain Explorations?
   b. What do you hope to do at Mountain Explorations?
   c. What will nature be like at Mountain Explorations?
   d. What will you be learning at Mountain Explorations?

14. Do you have any concerns about going to Mountain Explorations?
   a. What are you most nervous about for your time at Mountain Explorations?
   b. Why?

15. What are you looking forward to most at Mountain Explorations?
   a. Why?

16. Do you have any questions for me?
Post-Mountain Explorations Interview Script (semi-structured interview format)

1. Thinking back over Mountain Explorations what was the natural environment like?

2. How is nature the same or different at Mountain Explorations and here in Bellingham?

3. What was the best nature memory from Mountain Explorations?

4. Tell me about your trail group.

5. How did you feel walking along the trails?

6. Tell me about your favorite trail activity? What did you learn? How did you learn that?

7. What was the hardest thing about Mountain Explorations?

8. How is the learning at Mountain Explorations different than at school?

9. Hypothetically, your school principal is thinking about cutting the funding for Mountain Explorations. What would you say to defend your position?

Read each child’s initial perceptions of nature out loud from the Pre-Program transcripts and ask, what would you add your description of nature today?

Respond to these prompts:

1. I think nature is. . .

2. I affect nature by. . .


4. My favorite outside spot is. . .
# Appendix B: Individual Tables

Table B.1 Carmen’s Expressions of Environmental Values

<table>
<thead>
<tr>
<th>VALUES</th>
<th>Themes &amp; Subthemes</th>
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Table B.2 Paige’s Expressions of Environmental Values

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Appendix C: Documents

Figure C.1  Learning Center

Figure C.2  Day One: Arrival
Figure C.3  Day One: Introduction to Web of Life

Figure C.4  Day One: Water and Glaciers in the North Cascades
Figure C.5  Day One: Geology

Figure C.6  Day One: Weather
Figure C.7  Day Two: Forest Food Chain

Figure C.8  Day Two: Each One Teach One
Figure C.9  Day Two: Bone Lab

Figure C.10  Day Two: Microscope Lab
Figure C.11  Day Two: How Does Your Garbage Grow?

Figure C.12  Day Three: Bringing It Back Home
Figure C.13  Day Three: Postcards

Figure C.14  Day Three: Nature Writing and Animal Poetry
Figure C.15  Day Three: Closing Circle and Unselfish Wish

Figure C.16  Day Three: Departure
Appendix D: Ethics Certificate

The University of British Columbia
Office of Research Services
Behavioral Research Ethics Board
Suite 402, 6100 Agronomy Road, Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL - FULL BOARD

PRINCIPAL INVESTIGATOR:
Jole Meyer-Smith

INSTITUTION / DEPARTMENT:
School of Education/Curriculum and Pedagogy

UBC BREB NUMBER: 2009-01768

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:
N/A

Other locations where the research will be conducted:

This research will take place at three sites that include two 5th grade classrooms in the Bellingham Public School District, Washington, U.S., and the North Cascades Environmental Learning Center, Washington, U.S., in partnership with the City of Seattle and the National Park Service, the North Cascades Institute (NCI) opened the North Cascades Environmental Learning Center (NCEL) in 2003. The forested campus features 16 buildings clustered on the shores of Diablo Lake in North Cascades National Park, located along State Route 20 less than three hours northwest of Seattle. The Learning Center models earth-friendly design and operations: Surrounded by 7,000,000 acres of protected public lands in Washington and British Columbia, this magnificent wilderness setting is the home of the Mountain School program.

CO-INVESTIGATOR(S):
Don Burgess

SPONSORING AGENCIES:
N/A

PROJECT TITLE:
Listening to children:
Perceptions of nature and biophilia at Mountain School

REB MEETING DATE: November 13, 2008
CERTIFICATE EXPIRY DATE: November 13, 2008

DOCUMENTS INCLUDED IN THIS APPROVAL:

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DATE APPROVED: November 27, 2008

5/08/08 9:30 AM
The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:

Dr. M. Judith Lynam, Chair
Dr. Ken Craig, Chair
Dr. Jim Rupert, Associate Chair
Dr. Laurie Ford, Associate Chair
Dr. Anita Ho, Associate Chair