Evaluating the Impacts of a Service-Learning Conservation Program on Participants' Environmental Knowledge, Attitudes and Skills

by

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ABSTRACT

The Conservation Crew Program (CCP), an initiative of the Student Conservation Association, is a conservation-based service-learning program. The purposes of this study were to evaluate the impacts of the CCP on participants' environmental knowledge, attitudes, and skills development; to critically examine the draft objectives for environment education of the CCP; and to propose recommendations for future directions incorporating environmental education more effectively.

Qualitative and quantitative data collection methods included questionnaires, interviews, and participant journals. Quantitative results indicated knowledge and attitudes towards the environment were not positively affected by the CCP. Conversely, qualitative results indicated the CCP positively affected participants' knowledge, attitudes and skills. From the results several discussion areas emerged, including the question of transferability of learning to participants' home communities, the role of crew leaders as environmental educators, and the suitability of the draft objectives within the context of the CCP. Building on these results, recommendations are offered, including revisiting existing objectives, enhancing crew leader training, increasing the transferability of learning to participants home communities, and incorporating a more planned environmental education curriculum.

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INTRODUCTION

The Student Conservation Association (SCA) is the largest service-based conservation organization in North America. Through SCA young adults from all walks of life are given the opportunity to participate in service learning programs designed to help the environment. Included amongst the different programs that SCA offers is the Conservation Crew Program (CCP), a tuition-free program specifically designed for high-school aged students. Within the CCP, young adults are provided with the chance to participate in month-long service-based conservation projects located in the outdoors. Projects range from trail construction and maintenance to riparian area restoration to the removal of invasive species. During this time participants eat, sleep, and work in the outdoors, often in wilderness locations far removed from urban centres. For many participants, this is the first in-depth exposure that they may have to the natural environment.

My first experience with the CCP was in 1998, when I was selected to co-lead a backcountry-based conservation crew. Taking a temporary leave of absence from my nine-to-five office job, I soon found myself amidst the dramatic North Cascade Mountains. Bounded on all sides by towering, snow-capped peaks and situated aside scenic Ross Lake, our camp setting was one that many would have paid to attend. Instead, the occupants of the camp, eight teenagers from across North America, were there as volunteers for a service learning program. It was with these eight young adults that I, along with a co-leader, spent the next five weeks working on a series of backcountry conservation projects. In some cases we diverted eroding trails away from creeks that were used as spawning channels by native trout; in others we worked to remove exotic species and restored native vegetation. In our

down time, lessons on backcountry ethics, wilderness living and travel, and environmental education filled our agenda, as did swimming, cooking and sleeping. The final week of our time together saw us embark on an ambitious backcountry hike that led us over mountain passes and through alpine meadows. This final week of the program was designed to implement newly learned outdoor skills and environmental ethics.

I was hooked. The following summer saw me solo guiding a crew in the San Jacinto Mountains of southern California. There, I spent thirty-one days leading a crew of six teenagers in conservations projects along the Pacific Crest Trail. Although isolated and high in the mountains, we were close to the 'desert divide' – the area where the mountains dropped straight off to the desert below. At night, we could hike from our pine tree-ringed base camp to the edge of the mountain, where the desert divide began. In the far off distance, we could see the lights of Palm Springs shining amongst the vast darkness of the surrounding desert. It was a vivid reminder to all of us that it didn't take much to remove ourselves so thoroughly from civilization. For thirty days we lived, worked, and learned in wilderness, without the need, or desire, to venture into town.

The next year, I signed up for not one, but two crews. The first, situated along the Rio Grande in eastern Texas, again saw a crew of six teenagers along with myself immersed in conservation projects. Due to the dramatic environmental differences, the specific nature of our work projects was vastly different than those of the west, but the overall theme remained the same: conservation projects focused on environmental restoration. When not jumping to avoid scorpions and tarantulas, we would work on removing exotic vegetation and restoring trails through sensitive desert habitat. At night, significant amounts of stargazing and night hiking would occupy our agenda. Our recreation trip involved exploring the far edges of Big Bend National Park.

Three days after leaving my crew in Texas, I found myself embarking on yet another CCP. This time, along with another coleader and eight crewmembers, I explored the far reaches of Yosemite National Park. Considered a 'roving crew' as we move campsites virtually every night, our job was to travel deep into the backcountry for weeks at a time, sourcing out and eliminating illegal backcountry campsites and minimizing human and stock impacts. For thirty days we travelled the backcountry, crossing mountain passes and descending into wild valleys, journeying into areas of the wilderness far removed from the notorious chaos of the over-burdened Yosemite Valley.

Having served on four different CCP crews left me with a deep appreciation of the nature for the programs. Many of my crewmembers frequently spoke during the program of the impact that these experiences would undoubtedly have on their lives when they returned home. And for many that I've since kept in touch with, their time with the CCP has indeed influenced them. For some, this influence has manifested through choice in school, for others, through volunteer and career work.

When not involved with the CCP I have been immersed in my work as an environmental education program coordinator for a non-profit conservation organization. Over the years, the focus of my work has shifted from developing knowledge-based programs for schools to developing programs designed to have a deeper, potentially more significant impact on the students that we worked with. Areas of inquiry that I found myself becoming drawn to included the role of knowledge acquisition and attitudes formation in environmental education, the importance of developing environmental skills, and the necessity of action learning. Developing programs that ultimately address the underlying elements of environmentally responsible behaviour became an ambition.

At the same time, I began to reflect back upon my experiences with the CCP. I became interested in exploring whether such a potentially powerful life experience as the CCP was, in fact, effectively teaching environmental education to its crewmembers. Every year, thousands of young adults pass through the CCP. The opportunity exists to foster within these young volunteers the necessary components for environmentally responsible behaviour. Was the CCP providing its crewmembers with the instructional opportunities and experiences that would, in turn, positively affect their environmental knowledge, attitudes and skills development? I knew that the CCP was certainly having an impact of some sorts on the young adults that participated in it, but was the impact that we were assuming really, in fact, the impact that was occurring? When in 2001 I learned of the CCP's new draft environmental education goal statement and objectives, the idea for this research project emerged.

The emergence of a draft goal and set of objectives for teaching environmental education to CCP participants is encouraging. However, the question remains as to whether the CCP is actually delivering these objectives. To have a list of objectives on paper is one thing; to have ideas translated into action in the field is another. As Hanna (1995) noted "a comparison of what outdoor programmers believe occurs with what actually does occur during and after such programs would be helpful for understanding what outcomes, if any, they have" (p.22). Is the environmental goal and its objectives for the CCP suitable for teaching environmental responsible behaviour, which is often considered to be the ultimate goal of environmental education?

With these questions in mind, the purpose for this research study materialized: to critically analyze the impacts of the CCP on the knowledge, attitudes and skills formation participants. Building on this analysis, a critical examination of the effectiveness of the draft

CCP environmental education goal and objectives is held. Finally, recommendations for the future are made that increase the potential for the CCP to assist its participants in becoming future environmental stewards. Assessing the effectiveness of the environmental education goal and objective of the CCP is an important first step towards achieving this important goal of creating future environmental stewards.

CHAPTER ONE

OVERVIEW OF THE STUDY

Chapter One begins with an overview of the nature of the problem and a brief discussion of the role of knowledge, attitudes, and skills development in environmental education. This is followed by an introduction to the CCP and its environmental education goal and objectives. Following this, the purpose, objectives, and research questions of the study are present. A brief overview of the study methodology and the subject selection process is also given. The chapter concludes with a review of the assumptions and limitations of the study.

Nature of the Problem

> If today is a typical day on planet Earth, we will lose 116 square miles of rainforest, or about an acre a second. We will lose another 72 square miles to encroaching deserts, as a result of human mismanagement and overpopulation. We will lose 40 to 100 species, and no one knows whether the number is 40 or 100. Today the human population will increase by 250,000. And today we will add 2,700 tons of chlorofluorocarbons to the atmosphere and 15 million tons of carbon. Tonight the Earth will be a little hotter, its waters more acidic, and the fabric of life more threadbare.
>
> Orr, 1991

In David Orr's 1991 commencement address to students at Oberlin College, he highlights just a few of the current environmental issues affecting the planet. Orr is not

the first to raise the alarm. Since the early voices of John Muir, Aldo Leopold, and Rachel Carson, to the present day warnings of Lester Brown, Paul Ehrlich, and David Suzuki, concern over humankind's impact on the environment has been voiced.

Paralleling these concerns are our efforts to prepare a world population that must be prepared to deal with both current and future environmental issues. The need to develop a global citizenry which is both ecologically literate and which practices environmentally responsible behaviours is critical. Similarly, there is the need to develop effective environmental education programs that will prepare ecologically literate citizens (McClaren, 1989). This holds especially true for youth, as they are the upcoming generation that will ultimately inherit environmental issues resulting from years of mismanagement, poor decision-making, and lack of adequate environmental prevention policies and laws.

An increase in demands on our existing wilderness and backcountry areas has contributed towards the decline of the overall environment. Heightened use of these areas by backcountry users has resulted in a multitude of environmental issues: air quality concerns, soil erosion, water pollution, the introduction of exotic species, and habitat degradation, to name just a few. As Hanna (1988) notes, "the absolute numbers of individuals seeking active outdoor educational/recreational experiences...continue(s) to grow, placing additional stresses on our ever diminishing wildland resource base" (p.2). Without proper attention, wilderness lovers run the risk of literally 'loving our wildlands to death'.

Thus, there remains the need for citizens to be prepared to both prevent new environmental problems as well as implement solutions to existing problems. As Caduto (1985) observes,

> With each passing decade it becomes more evident that lasting, long-term solutions to environmental problems can only come from a commitment, on the part of individuals and groups, to pursue positive environmental lifestyles and policies – ones that will preserve the ecological integrity of our planet (p. 31).

In order to develop such a population, there is the need to instil the knowledge, attitudes, skills, and beliefs under an overarching ecological ethic in today's young adults in order to create ecologically literate individuals that will practice environmentally responsible behaviours for the future.

Indeed, many researchers have argued that the ultimate goal of environmental education is to produce ecologically literate individuals who demonstrate environmentally responsible behaviour (Ballantyne & Packer, 1996; Bogner, 1998; Culen & Volk, 2000; McClaren, 1989). In order to achieve such an outcome, developers of effective environmental education programs must ensure that a proper blend of both knowledge and awareness, in conjunction with a focus on the formation of environmentally positive attitudes, skills development, environmental problem solving, and competency in action occurs. The relationship between effective environmental education and the acquisition of environmental knowledge and attitudes, as well as the importance of developing a population comprised of ecologically literate individuals that practice environmentally responsible behaviour, is discussed at greater length in Chapter Two of this research study.

Environmental education that strives to foster environmentally responsible behaviour can occur in many different forms – through in-class programs, visits to local nature centres, attendance at summer day camps, full immersion in wilderness-based/backcountry, multi-day programs, or through service learning. Each model has its own strengths and weaknesses in striving to meet the ultimate goal of environmental education. Overall, a great deal of research examining the effectiveness of environmental education interventions has been conducted, with some areas such as day camps, short-term residential camps, and in-class programs receiving more attention than others (Dettmann-Easler & Pease, 1999; Eagles & Demare, 1999; Jordan, Hungerford & Tomera, 1986; Keen, 1991; Shepard & Speelman, 1986). Chapter Two of this study pays greater attention to the findings of key studies related to these topics.

One method that has shown to incorporate environmental education into its curriculum is that of service learning. Research has revealed that service learning can be an effective means of fostering environmental knowledge, environmental attitudes, and skills that aid youth in adopting environmentally responsible behaviours (Booth, 1998; Bowler, Kaiser & Hartig, 1999; Driver & Johnston, 1989).

The Conservation Crew Program

One organization that has been actively involved in service learning from several decades is the Student Conservation Association (SCA). "Changing Lives Through Service to Nature" is the SCA motto. Through the CCP the SCA strives to use service learning as a means of fostering shifts in environmental knowledge and positive environmental attitudes amongst young adults.

Formed in 1957, the SCA was an initiative of Elizabeth Titus Putnam. While studying at Vassar College, New York State, in 1955, Putnam grew concerned over the rate at which America's national parks were becoming impacted by growing numbers of recreational users. In a senior year thesis Putnam proposed that one answer to the increasing problem of park deterioration was to apply the volunteer services of young adults towards the care-taking of public lands. Putnam argued that youth would not only be willing and able to volunteer their time to restore damaged public lands, but that through their services these youth would gain valuable skills and lessons that would foster a lifelong stewardship ethic towards the environment. Two years later, the first SCA conservation crews entered the field, with 53 volunteers participating in backcountry service projects in Grand Teton and Olympic National Parks.

SCA is now the largest conservation service organization in North America, with over 35,000 alumni and, on average, thousands of young adults participating yearly in service-based conservation programs. Although SCA has evolved over the past 47 years, its mission has remained true to its origins:

> To build the next generation of conservation leaders and inspire lifelong stewardship of our environment and communities by engaging young people in hands-on service to land.
>
> SCA, 2001

Today under SCA several different programs occur. Of central interest to this study is the CCP.

From fire education to backcountry restoration projects, the CCP offers youth aged 15 to 19 the unique opportunity to volunteer their services to nature. During the

summer months, co-ed crews of six to eight young adults spend three to four weeks working on designated conservation improvement projects often located in remote, backcountry settings. During this time service work such as trail reconstruction or plant restoration occurs, as do lessons on backcountry ethics, wilderness living and travel, and environmental education. The final week of each program involves an extended backcountry hike designed to implement new outdoor skills and environmental ethics learned throughout the program.

The CCP holds the powerful potential to instil in its participants the knowledge, attitudes, skills, and actions strategies to foster environmentally responsible behaviour. Participation in an action-based project in combination with first-hand experience of the natural environment can be a powerful opportunity in which the instillation of environmentally responsible behaviour can occur. But the need for an environmental education curriculum that recognizes and reflects the underlying tenets of environmental education is required in order for the CCP to more accurately meet its stated objectives.

In recent years the CCP has taken a renewed interest in more effectively integrating key environmental education learning into the CCP. Among the more noticeable steps the CCP has taken is the drafting of an *Environmental Education Learning Track Goal* and it's associated *Objectives* (2001). These are as follows:

CCP Environmental Education Track Goal

To provide opportunities to participants to develop environmental awareness and concern. Participants will gain the knowledge, skills, attitudes, motivation, and

commitment to work individually or collectively towards solutions of current problems and the prevention of new ones.

CCP Environmental Education Objectives

Every crew participant will successfully demonstrate the following by the end of a CCP:

a) Discuss a minimum of three elements of a healthy environment.
b) Identify a minimum of three plants species that exist in the immediate environment, their role and interdependence in the ecosystem.
c) Identify a minimum of three animal species that exist in the immediate environment, their role and interrelationship in the ecosystem.
d) Explain the process of, and identify examples relating to producers, consumers, and decomposers.
e) Discuss the process of ecological succession.
f) Identify at least three ways humans impact the local environment.
g) Identify at least three of the resource management principles of the area they serve.
h) Discuss the philosophies of at least three public and/or private natural resource management agencies.
i) Identify at least three stewardship practices learned during SCA crew that can be applied in the home environment.
j) Learn about and practice recycling on the crew.

k) Relate project to contemporary conservation efforts.

l) Discuss meteorology (e.g., weather patterns) specific to the service area.

m) Discuss the role of SCA within the environmental movement.

SCA, 2001

At first glance, while the draft goal established for the CCP appears to be well founded, many of the underlying draft objectives designed to help achieve this goal are focused solely within the knowledge domain. Whether there is a need to integrate a stronger focus on attitude and skills development within the existing objectives will be explored in Chapter Five of this research study. For the purposed of this study it is important to remember that the draft objectives have yet to be tested against the stated outcomes of the CCP.

As well, very little systematic research has been conducted on the overall impacts of the CCP on environmental knowledge, attitudes, and skills formation. Perhaps the most significant research study involving the CCP to date is the 1998 Kellert investigation of the impacts of three outdoor wilderness programs (Outward Bound, National Outdoor Leadership School, and SCA) on, amongst other topics, participants' knowledge and attitudes. From this study Kellert concluded that a "lack of sufficient and rigorously derived data [sic] has been particularly evident in the case of the Student Conservation Association" (p.6). Kellert determined that a need to greater analyze the relationship of knowledge and attitudes within the SCA programs, including the CCP, as well as the need to examine the effectiveness of environmental literacy development amongst its participants, is required. The researcher concluded that a "far more in-depth and focused study will be needed before we fully understand the impacts of this

experience, and how we can more effectively incorporate its full potential into more conventional educational systems and curricula" (p.190). The methods used in the Kellert study, including instrument development and nature of the research questions, were instrumental in the development of the current research study.

For the purposes of this research study, environmental knowledge will be defined as understanding how the environment functions, the ecological basis for environmental problems, the consequences of environmental problems, and understanding of how to take action to prevent future or resolve existing environmental problems (Hines, Hungerford & Tomera, 1986-1987). Similarly, in regards to the CCP and this research study, environmental attitudes can generally be considered to have three components: the affective (individual or emotional feelings about the attitude object); the cognitive (the belief or knowledge about the attitude object); and the behavioural/conative (the individual's predisposition to act towards the attitudinal object in a particular way). Attitudes can serve as a viewpoint towards a particular object, and thus may predispose an individual's actions (Gall, Borg, & Gall, 1996).

Thus, the focus of the current study is on the effects that the CCP has on the development of participants' environmental knowledge, environmental attitudes, and environmental skills, three important precursors in the development of environmentally responsible behaviour. Through the use of both qualitative and quantitative methods a backcountry service-learning program, the CCP, is explored.

Purpose of the Study

The main purposes of this research are to critically explore and analyze the impacts of an outdoor service-based conservation program on participants' environmental knowledge, environmental attitudes, and environmental skills development; to examine the draft environmental education objectives of the CCP in light of participant experiences; and to propose recommendations for future directions for the CCP towards incorporating environmental education into upcoming CC programs.

Objectives of the Study

The following specific objectives for this study were:

1. Determine whether participants increase their level of environmental knowledge by participating in the CCP.
2. Determine whether participants demonstrate a shift in positive environmental attitudes by participating in the CCP.
3. Determine whether participants demonstrate a shift in positive environmental skills by participating in the CCP.
4. Evaluate the effectiveness of the draft environmental education goal statement and objectives for the CCP, and identify recommendations for improvement to SCA.

Research Questions

This study addressed the following research questions:

1. Does participation in the CCP result in an increase in participants' environmental knowledge (as it pertains to the goal and objectives of the CCP)? If so, what new knowledge is gained?
2. Does participation in the CCP result in a positive change in participants' environmental attitudes?
3. Do participants of the CCP gain new skills to work towards solving and preventing environmental problems? If so, what new skills are gained and how will these new skills prevent environmental problems?

Methods Overview

Research for this project consisted of the use of a case study format. For this research study, the case is defined as the CCP, the focus was on examining the effects of the CCP on participants' environmental knowledge, environmental attitudes, and environmental skills, and the units of analysis were the CCP participants themselves. Data for this study were collected before, during, and after the program. Data gathering comprised both qualitative and quantitative research methods.

Qualitative data was collected through crewmember interviews. Ranging in length from one to two hours in duration, each interview was semi-structured in format and was conducted in effort to gain greater insights into the research topics. Open-ended questions allow flexibility to be retained while the interviewer probed deeper into specific topic areas, allowing for additional information to come to light. Thirty-two interviews

were conducted towards the end of the third week of each program. A copy of the interview questions is in Appendix A. Participant journals were also used to collect qualitative data.

Quantitative data was collected through the administration of pre-test and post-test questionnaires. The primary function of the questionnaires was to analyze for a change in the environmental knowledge and attitudes of participants in the CCP. In addition to knowledge and attitudes, general participant information, past experience, opinions, expectations, and skills were also measured. Questions were generally presented in either a Likert scale format, or as open-ended questions. An example of a Likert scale question from the knowledge section of the pre-test and post-test questionnaire is "An organism that feeds on both plants and animals is a ___? (a. omnivore). An example of an open-ended question, taken from the *Your Feedback* section of the post-test questionnaire, is "Do you think this program had any major effect on your feelings of responsibility towards caring for the environment"? Crew leaders administered questionnaires within the first two days of the program and again on the last day of the program. Twenty-six sets of pre-test and post-test questionnaires were returned.

Chapter Three of this study describes in detail both the quantitative and qualitative data collection techniques. As well, data analysis is also discussed in Chapter Three.

Participant Selection

The participants for this study were crewmembers of six different CCPs. In consideration to the method of sample selection, the method used was one of purposeful sampling. This method allowed for an in-depth focus on the selected study issues where "the researcher looks at...what he wants to know, what will be useful, what will be credible, and what can be done within the constraints of time and resources" (Patton, 1990, p.184, as cited in Cantrell, 1990).

To select subjects for the study, the SCA Western Operations office provided the researcher with a database of all CCP crews for the 2002 field season. A SCA Director then worked in conjunction with the researcher to select crews whose members would be the subjects for this study. Of a total of 109 crews operating during the 2002 field season, six were selected to participate in this study. In order to both provide replications in the study findings (Yin, 1994; Gall et al, 1996) as well as to account for the potential of crew cancellations due to environmental hazards (forest fires, etc.), sponsoring agency funding cuts, or other such circumstances, additional crews were selected to be included in the study.

Crews that were chosen as the population of interest were selected based on the following criteria:

1. Crew Diversity: In order to increase the degree of diversity amongst crewmembers, crews that were comprised of individuals drawn from across the United States were selected. By choosing crews whose participants were selected on a national level, the potential for obtaining a higher degree of

cultural and ethnic diversity amongst participants existed. Ideally, this would allow for results to be generalized.

2. Crew Location: To allow for field visits from the researcher, crewmember participants enrolled in thirty-day SCA Conservation Crew service programs in Washington, Oregon, and California, between the dates of July and August 2002 were selected. This allowed the researcher to visit each crew during their program to conduct the necessary participant interviews.
3. Crew Leader Training: Each of the selected crews' leaders were present at the annual CCP Western Spring Training and had participated in an environmental education training and orientation workshop conducted by the researcher. This workshop introduced to the crew leaders the draft goal statement and objectives of the CCP, and included strategies and techniques for fostering the inclusion of environmental education into individual CCPs.
4. Crew Structure: Each crew selected shared a number of characteristics, which resulted in their being similar in overall structure. These included each crew being composed of six youth members in total, have two crew leaders, being of four weeks in duration, having conservation projects similar in scope and size, and being neither an alumni nor a roving crew.
5. Environmental Consistency: The ecological base in which each crew operated was also an important consideration within the selection process. In order to provide a greater degree of similarity across the selected crews, those that shared operations within same or similar ecosystems were selected. This included: a shared similarity in climate, ecology, and environmental

degradation experienced; proximity to urban areas; and the degree of amenities made available to the crew during their program (ex. washing facilities, telephones, etc). While the effort was made to select crews that were solely based in the backcountry, this was not entirely feasible in each circumstance. As a result, two crews that were predominantly rural (i.e. removed from the urban environment) but not exclusively backcountry (i.e. wilderness based) were selected.

Overall, 15 males and 19 females were involved in the study, with participants varying in age from 15 to 19 years of age. The six crews chosen for this study were located across three western United States (Washington, Oregon, and California). The crews selected were: Golden Gate National Recreation Area One (GGNRA1) and Golden Gate National Recreation Area Two (GGNRA2) in California; Deschutes National Forest One (DNF1), Deschutes National Forest Two (DNF2), and Deschutes National Forest Three (DNF3) in Oregon; and North Cascades National Park (NCNP) in Washington. The context of each crew and their service projects is described briefly as follows.

Golden Gate National Recreation Area One (GGNRA1)

The GGNRA1 crew was comprised of three male and three female crewmembers, and was led by a male and a female crew leader. Situated one hour south of San Francisco, the GGNRA1 crew was located within the Golden Gate National Recreation Area complex on the Phleger Estates Ecosystem. At over 1,200 acres in size Phleger Estates is a key part of a 50-mile wide habitat corridor. The GGNRA1 conservation project primarily consisted of trail rehabilitation and streamside restoration of riparian zones within the Sanfransquito Watershed. An emphasis was placed on working to

prevent trail erosion in areas of steelhead salmon habitat. Over the course of four weeks, the GGNRA1 crew base camped at a rustic National Parks Service site, which provided limited access to potable water and mail delivery. In addition to this base camp, crewmembers also spike camped deeper within the Estate itself. The fourth week of their program saw the crew embarking on a recreation trip that included backpacking along selected sections of coastal northern California.

Golden Gate National Recreation Area Two (GGNRA2)

GGNRA2 originally consisted of three males and three females. Attrition resulted in four individuals (two males and two females) participating in this study. Participants of the GGNRA2 were involved in conservation service projects within the Golden Gate National Park Recreation Area. Their particular work site was located approximately one hour north of San Francisco city. GGNRA2 participants worked for three weeks; a fourth week was spent on a backpacking trip in Yosemite National Park. While engaged in the service-learning portion of their project, crewmembers were base-camped in a rural meadow within two miles of their work project. Ringed with Eucalyptus trees and bound by grassy rolling hills, their base camp was also located with quarter mile of the Pacific Ocean. The work project consisted primarily of trail reclamation and exotic species removal. In addition, crewmembers assisted wildlife biologists in the monitoring of a local coyote population

Deschutes National Forest One (DNF1)

The DNF1 crew was comprised of four females and one male. Earlier attrition resulted in two males being dismissed from the program. Two female crew leaders led the team. The DNF1 crew was located on the eastern side of the Cascade Mountains in

central Oregon, within the Sisters Forest Ranger District. For three weeks the DNF1 crew based camped at a remote site with limited services. During this time, they were applied in various service-learning projects designed to improve trails, eliminate erosion, and encourage backcountry users to curb off-trail explorations. Water bar installation, rock wall development, and trail re-treading were included in their service project.

Deschutes National Forest Two (DNF2)

The DNF2 crew, which consisted of three females and three males, was also located in the Deschutes National Forest area, within the Crescent Ranger District. The DNF2 crew spent the majority of their work project camped in a remote, backcountry location. This site, situated close to a higher-elevation lake, allowed crewmembers to perform a number of trail rehabilitation projects deep within the backcountry. Low impact camping was a mainstay of their daily operations. During the service portion of their program, crewmembers worked to restore trails that had been significantly degraded by pack stock, implement measures to curb erosion, and minimize the effects of inappropriate campsites established by previous users.

Deschutes National Forest Three (DNF3)

The DNF3 crew was also located within a remote backcountry setting in the Crescent Ranger District. Comprised of five crewmembers (three females, two males) and led by one male and one female crew leader, the DNF3 service project was similar in scope and nature to that of the DNF2 crew. They were also involved in the construction of several riparian crossing projects. Similar to the DNF2 crew, DNF3 base camped within a backcountry setting, amidst forest groves, higher elevation lakes, and spectacular views of neighbouring mountains.

North Cascades National Park (NCNP)

The NCNP crew consisted of three female and three male crew members, and was led by one male and one female crew leader. Located on the western slopes of the Cascades Mountains in Washington State, the NCNP members spent the entire duration of their program deep in the backcountry. During this time, crewmembers worked extensively on trail reclamation and servicing. Specific projects included trailside vegetation trimming, water bar installation, and bank reinforcement. As work progressed further down the trail a series of spike camps were utilized. The final week of their program saw an ambitious backcountry hike over multiple passes and through rigorous terrain.

Timeline

Phase One of the study (December 2001 to February 2002) consisted a review of the existing literature relevant to the study. While this literature review was to be on going throughout the study, the majority of it occurred during Phase One. Phase Two of the study (March to May of 2002) consisted of the development, piloting and refinement of the data collection instruments. Phase Three (June to July 2002) included the collection of pre-test data. Phase Four (July 2002 to December 2002) included the collection of post-test data, as well as participant interviews. Phase Five of the study (January 2003 to April 2003) included interview transcription and data entry. Phase Six (October 2003 to February 2004) included data analysis and development of recommendations.

Assumptions of the Study

The following assumptions were made:

1. It was assumed that individuals participating in the study were representative high school students and did not represent unusual cases.
2. It was assumed that the selected conservation crews studied had an impact on the domains studied (environmental knowledge, environmental attitudes, and environmental skills).
3. It was assumed that both the pre- and post-program questionnaires were administered fairly and that the answers given by the students were their own.
4. It was assumed that the instruments used to gather data provided for an accurate measure of the intended domains.

Limitations of the Study

As Merriam (1988) notes, "all research is concerned with producing valid and reliable knowledge in an ethical manner" (p.198). It is acknowledged that as both the researcher and a former CCP crew leader, bias within this research study could occur. In order to diminish against bias within the current research study, a number of techniques were employed.

Triangulation. Both multiple sources and multiple methods of data collection were employed. These included participant interviews, questionnaires and journaling. Ideally, biases that might otherwise result from relying exclusively on only one method of data collection may be eliminated (Creswell, 1998, p.575). In addition, by conducting

individual interviews as opposed to group interviews, it was hoped that the validity of the case study findings would be enhanced (p. 557).

Member Checks. Verification of both the description and interpretation of data collected from interviews and journals was accomplished by taking a preliminary draft of the data interpretation to the CCP participants for feedback. This feedback was then incorporated into the final study. In order to help facilitate the feedback process, each participant was asked a series of questions, such as "Is the description of the program itself accurate?", "Is the description of his/her participation within the program accurate?" and "Are the themes and constructs identified consistent with his/her experiences?". In addition, the Western Operations Director for the CCP was asked to review the researcher's interpretation of the program's mission statement, intended goal, and objectives for verification of accuracy. No changes were recommended.

Peer examination. A collection of colleagues, including environmental education consultants, CCP crew leaders and administrative staff, and curriculum developers were asked to review the findings of the research. Peers were asked to use their own experiences to validate the conclusions drawn by the researcher.

Instrument Review. The colleagues involved in the peer examination process also reviewed the data collection instruments, providing input on both content and structure. In addition, both questionnaires and interview questions were piloted with a representative sample of the study population. Piloting resulted in language, instrument structure and layout, re-ordering of questions, and individual question meaning being clarified and simplified in the final versions of the instruments.

Anonymity. Both questionnaires and journals used in the study were coded so that the participant could remain anonymous. The same code (participants' day and month of birth) was applied to both data collection instruments.

CHAPTER TWO

LITERATURE REVIEW

This chapter contains a review of the literature relevant to the general problem area as outlined in Chapter One. Because this study has several different components, the literature reviewed for this study has been divided into several different categories. The chapter begins with an overview of the rise of environmental education and the contemporary objectives and characteristics widely accepted by environmental education practitioners. The importance of developing a population that has both high levels of environmental literacy and environmentally responsible behaviour is discussed next. This is followed by a discussion on the need for a paradigm shift within the environmental education movement. Following this, environmental knowledge and environmental attitudes, two important variables within the development of environmentally responsible behaviour are examined. Particular attention is paid to the importance of backcountry/wilderness experiences in environmental knowledge and attitude formation, as is the importance of service learning. The chapter concludes with a summary of the literature reviewed and its importance to the current research study.

Environmental Education – An Overview

> The care of the Earth is our most ancient and most worthy, and after all our most pleasing responsibility. To cherish what remains of it and to foster its renewal is our only hope.
>
> Wendell Berry

Appreciation, care, and concern for the environment has been documented for many years. From the early works of John Muir, Aldo Leopold, and Henry David Thoreau, amongst others, our relationship to as well as concern over humankind's impact on the environment has been well discussed and documented. From the 1851 writings of Thoreau's "in wildness is preservation of the world", to Muir's formation of the Sierra Club thirty years later, Leopold's publishing of *The Land Ethic* in 1948/49, Rachel Carson's *Silent Spring* in 1962, and Paul Hawken's *Ecology of Commerce* in 1993, considerable attention has been given to both the results of humankind's actions on the natural world, as well as the need for a re-conceptualization of how we view ourselves in relation to the environment. As Leopold notes in *The Land Ethic*, the need for a set of conservation ethics that recognized a 're-visioning' of the land was required. This re-visioning would see the land as:

> Far more complex than a set of resources, or even a collection of individual plants and animals...(but) rather...a set of ecological interactions and relationships, interactions and relationships that could be disrupted only at great risk to the health and integrity of the land. (Booth, 1998, p.5)

In 1962 Rachel Carson's release of *Silent Spring*, a seminal work documenting the effects of pesticides in the environment, brought about a new sense of urgency in how humankind interacted with their environment. From this movement, a different emphasis began to emerge, one of awareness of human complicity in environmental decline and the involvement of public values that stressed the quality of the human experience and hence of the human environment (NEEAC, 1996). Public concern over our effects on the world around us began to mount. Events that both celebrated the environment as well as called

to attention the issues affecting it became increasingly popular. In 1970 Earth Day was born. Those that taught about the environment called for a new type of curriculum that included an examination of the values and attitudes people used to make decisions regarding the environment (Einstein, 1995). And towards this time, environmental educators began work towards a common definition for environmental education.

Environmental Education Defined

> Environmental education has been defined and redefined over the last twenty-five years. Definitional issues are inherent in a field this broad and encompassing. It is generally agreed that environmental education is a process that creates awareness and understanding of the relationship between humans and their many environments – natural, man-made, cultural, and technological. Environmental education is concerned with knowledge, values, and attitudes, and has as its aim responsible environmental behaviour. (NEEAC, 1996, p.3)

Much of the work on environmental education within the last quarter century has been guided by the *Belgrade Charter* (UNESCO-UNEP, 1976) and the *Tbilisi Declaration* (UNESCO, 1978). These two documents furnish an internationally accepted foundation for environmental education.

The *Belgrade Charter*, developed in 1975 at the United Nations Educational, Scientific, and Cultural Organization Conference in Yugoslavia, provided a widely accepted goal statement for environmental education:

> The goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (UNESCO, 1976)

In essence, the goal of environmental education is to develop a world population that is both environmentally literate and that practices environmentally responsible behaviour.

Following Belgrade, the world's first Intergovernmental Conference on Environmental Education was held in Tbilisi, Georgia. Building on the *Belgrade Charter*, representatives at the Tbilisi Conference adopted the *Tbilisi Declaration*, which challenged environmental educators to create awareness and values amongst humankind in order to improve the qualities of life and the environment. A major outcome of Tbilisi was the development of detailed objectives for environmental education. Most environmental educators have since universally adopted these objectives, which are as follows:

> Awareness: to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
>
> Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and it's associated problems.
>
> Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

> Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.
>
> Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (UNESCO, 1978)

The outcomes of Tbilisi and Belgrade have, in many ways, provided the basis for many environmental education programs worldwide. Having both a commonly accepted goal statement and associated set of objectives has allowed many educators to better address the desired outcomes of their individual programs.

Equal to the need to identify both a common goal and set of objectives is the need to consider the characteristics of environmental education. In *Environmental Education Materials: Guidelines for Excellence* (1996) the North American Association for Environmental Education (NAAEE) identify a number of specific characteristics of environmental education. According to NAAEE, environmental education:

> Is learner-centred, providing students with opportunities to construct their own understandings through hands-on, minds-on investigations; involves engaging learners in direct experiences and challenges them to use higher-order thinking skills; is supportive of the development of an active learning community where learners share ideas and expertise, and prompt continued inquiry; and provides real-world contexts and issues from which concepts and skills can be used. (NAAEE, 1996, p.1)

These characteristics, when applied in conjunction with the above-mentioned goal and objectives for environmental education, have allowed environmental educators to

develop programs that lend to the formation of positive beliefs, attitudes and values concerning the environment as a basis for assuming a wise stewardship role towards the earth (Caduto, 1985). It is the ultimate hope that the combined objectives and characteristics for environmental education, when applied, will result in the development of environmentally literate citizens.

Environmental Literacy and Environmentally Responsible Behaviour

The concepts of environmental literacy and environmentally responsible behaviour have received a great deal of attention within the realm of environmental education (Ballantyne & Packer, 1996; Disninger & Roth, 1992; Hungerford, Peyton & Wilke, 1980; Marcinkowski, 1991; McClaren, 1989; Morrone, Mancl & Carr, 2001; Roth, 1968; Stapp, 1969).

According to Roth (1968) individuals who demonstrate high levels of environmentally literacy hold the following characteristics: environmental knowledge; environmental attitude and sensitivity; problem solving, planning and collaborative/facilitative skills; action strategies; and the ability to take action to improve the environment. To become environmentally literate individuals must have a necessary understanding of ecological processes and systems interactions, the relationship between the living and the non-living components of the environment, and the capacity to take action towards helping maintain or restore the health of the environment.

Building on this definition of an environmental literate individual, Milt McClaren, in his 1989 paper, *What is Environmental Literacy?* outlined eleven elements of environmental literacy. These included: the ability to think about systems; the ability to

think in time – to forecast, to think ahead and to plan; the ability to critically think about value issues; the ability to work co-operatively; the capacity to move from awareness to knowledge to action; the possession of field skills and character skills (patience, persistence, and encouragement for others); and the understanding of the problem of human nature (p.85-87). In regards to this last element, McClaren noted this understanding will arise only when we "understand our relationship to (natural) systems and...reintegrate ourselves with them" (p.87). McClaren concludes with the recommendation for infusing environmental literacy teaching throughout all schooling, from kindergarten to grade twelve. McClaren's work supports the writings of others, such as Morrone et al. (2001), who note that "environmental literate individuals are equipped with more than just knowledge about ecology; a completely literate person combines knowledge with values, which leads to action" (p.34). Thus, an environmentally literate individual will actively engage in environmentally responsible behaviours.

Environmentally responsible behaviour has been widely adopted as the primary goal of environmental education (Culen, 1994; Hungerford et al., 1980; Leeming, Dwyer, Porter & Cobern, 1993; Stapp, 1969). Hungerford et al. (1980) defined environmentally responsible behaviour as:

> An environmentally literate citizen (who) is able and willing to attempt to make environmental decisions, which are consistent with both a substantial quality of human life and an equally substantial quality of the environment. Further, this individual is motivated to act on these decisions either individually or collectively. (1980)

The development of an individual whom demonstrates environmentally responsible behaviour is related to eight interacting variables: knowledge of issues; beliefs concerning issues; individual values; individual attitudes; locus of control; environmental sensitivity; knowledge of and skill in the use of environmental action strategies; and ecological concepts (Ramsey and Hungerford, 1989). There is high degree of likelihood that an individual whom possesses a high degree of each of the variables may also demonstrate environmentally responsible behaviour.

However, it has been suggest that the development of a world population of environmentally literate citizens has been hampered by the ways in which we view our position within the environment. As C.A. Bowers (1996) asks, "Why has ecological literacy become so difficult for modern cultures to understand and carry out successfully?" (p.8). In response, it has been argued that in order to achieve a global community of environmentally literate citizens, a shift in the general worldviews held by the majority of the population is first required.

The Need for a Paradigm Shift

In order to address the current environmental crisis's facing the world we must first address the underlying worldviews that the North American population holds in consideration of the natural world (Albrecht, Bultena, Hoiberg & Nowak, 1982; Bogner, 1998; Bowers, 1996; Dunlap & Heffernan, 1975; Dunlap & Van Liere, 1978; Gigliotti, 1990; Negra & Manning, 1997; Orr, 1992; Sanger, 1994; Sandlos, 1998). Dunlap and Van Liere (1978) note "numerous writers have argued that our nation's ecological problems stem in large part from the traditional values, attitudes, and beliefs prevalent

within our society" (p. 10). This traditional worldview can be traced back to the times of Descartes and the Scientific Revolution, when, through knowledge of scientific principles, humankind positioned itself as master over nature (Murphy, 1996) and was further reinforced during the Industrial Revolution, when nature was viewed by society primarily as an infinite source of resources. Individuals were considered to be separate from nature (Murphy, 1996).

This has led to our visioning of the natural environment as separate from ourselves and as the natural world existing for utilization and exploitation rather than conservation and preservation. It is grounded in an anthropocentric tradition, and is based on the perception that society holds as being separate from the natural environment. The foundation of this worldview sees humankind as separate from nature, not as a member of an interdependent community; a deep-seated assumption that technology will provide the solutions to current environmental crisis is an under-riding theme (Bowers, 1997; Orr, 1997). Prevalent themes within this worldview include acceptance of the exploitation of natural resources, a belief in abundance and progress, a devotion to growth and prosperity, faith in technology, and a commitment to a laissez-faire economy (Bogner, 1998; Orr, 1996). David Orr, a prominent environmental educator, suggests that this environmental crisis today's society faces is a result of how both individuals and institutions think. According to Orr, "the ecological crisis, in other words, is a crisis of education, not one in education; tinkering won't do" (1996, p.7). Dunlap and Van Liere (1978) refer to this worldview as the Dominant Social Paradigm.

In response, several authors (Albrecht et al., 1978; Dunlap & Van Liere, 1978; Gigliotti, 1990; Hammond, 1996) have argued for the adoption of an alternate worldview.

Under this proposed new worldview, the ideas of limits to growth, steady-state economics, a balance of nature and the rejection of the notion of nature existing solely for human use are required (Dunlap & Van Liere, 1978). Through this ecocentric approach, anthropocentric perceptions are dismissed in favour of more altruistic principles (Bogner, 1998). Dunlap and Van Liere (1978) refer to this new worldview as the New Environmental Paradigm.

In order to achieve such a shift towards a more ecocentric approach within the context of environmental education, a holistic approach towards environmental education must be adopted.

> Environmental educators need to consider the adoption of a more holistic approach to teaching/learning that recognizes the interrelatedness of environmental knowledge, attitudes/values and behaviours, and seeks to promote informed, environmentally sensitive behaviour through the development of appropriate environmental conceptions. (Ballantyne and Packer, 1996, p.27)

By reforming our conceptions of our relationship within the natural environment, and thus departing from formerly held attitudes and beliefs, new ways of relating to the environment can be created (Ballantyne and Packer, 1996). Such a shift towards an ecocentric worldview will aid greatly in the development of an environmentally literate citizenry.

Environmental Knowledge and Environmental Attitudes

As previously noted, two of the objectives of environmental education as outlined by the *Tbilisi Declaration* are the acquisition of environmental knowledge and the

development of positive environmental attitudes. To refresh, the knowledge objective of environmental education is "to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems" (UNESCO, 1978, as cited in Hoffman & Thompson, 2003, p. 7); and the attitude objective is "to help...acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection" (UNESCO, 1978, as cited in Hoffman & Thompson, 2003, p. 7).

Enormous amounts of research dedicated to the areas of environmental knowledge and environmental attitude formation within the environmental education context has been conducted (Albrecht et al., 1982; Armstrong & Impara, 1991; Bogner, 1998; Culen & Volk, 2000; Dettermann-Easler & Pease, 1999; Dresner & Gill, 1994; Dunlap & Van Liere, 1978; Eagles & Demare, 1999; Emmons, 1994; Gambro & Switzky, 1996; Gillett, Thomas, Skok & McLaughlin, 1991; Hanna, 1988; Iozzi, 1989a; Iozzi, 1989b; Jordan et al., 1986; Keen, 1991; Leeming, Dwyer, Porter & Cobern, 1995; Leeming, Porter, Dwyer, Cobern & Oliver, 1997; Lisowski & Disninger, 1991; Maloney & Ward, 1973; Morrone et al., 2001; Ramsey, 1993; Richmond & Baumgart, 1981; Schindler, 1999; Scott & Willits, 1994; Tufuor, 1981; Weigel, 1984).

Areas of investigation within the research have been diverse. Some research has focused on the acquisition of environmental knowledge, attitudes, or behaviours within the formal school system (Armstrong & Impara, 1991; Culen & Volk, 2000; Gambro & Switzky, 1996; Jordan et al., 1986; Leeming et al., 1995; Leeming et al, 1997; Lucko et al., 1982; Ramsey, 1993; Richmond & Baumgart, 1981). Other studies have examined the impacts of environmental education interventions on knowledge and attitude

development of college students, adult citizens, or other special populations (Albrecht et al., 1982; Dunlap & Van Liere, 1978; Maloney & Ward, 1973; Morrone et al., 2001; Scott & Willits, 1994; Schindler, 1999). Yet others have investigated knowledge and attitude formation within non-formal settings such as summer camps, outdoor ecology programs, and other non-formal programs (Bogner, 1998; Dettermann-Easler & Pease, 1999; Dresner & Gill, 1994; Eagles & Demare, 1999; Emmons, 1994; Hanna, 1988; Keen, 1991; Kellert, 1998; Lisowski & Disninger, 1991).

Knowledge and attitude-related literature reviewed for this study was primarily contained to research focused on the development of environmental knowledge and environmental attitudes within the following contexts: non-formal outdoor experiences; middle- and secondary-level students knowledge and attitude development; and the relationship between environmental knowledge acquisition and positive environmental attitude development. This self-limiting was imposed in order to curb a possibly limit-less review.

Also, literature reviewed pertaining to environmental knowledge, attitudes, and behaviour has been divided into two sections. First, a general discussion of research involving environmental attitudes and knowledge acquisition is given. This includes the examination of studies investigating school-based environmental education programs (i.e. within the formal system); and studies investigating non-formal, outdoor education programs. Next, the relationship between the non-formal environmental education experience and environmental knowledge and attitudes development is discussed in conjunction with the role of wilderness and outdoor-based environmental education. The

key findings of the research reviewed and their relation to the current research study are discussed within these two sections.

Environmental Knowledge

It has been established that environmental knowledge is seen as an important precursor to environmentally responsible behaviour. A great deal of research has been dedicated towards the importance of developing a population that has a strong understanding of environmental concepts and processes (Gigliotti, 1990; Morrone et al., 2001). The development of a knowledge base can be considered important if today's youth are to become an informed body of citizens that will make intelligent, balanced decisions throughout their lives.

Concern has been raised that environmental knowledge is not being adequately taught within the context of environmental education (Dresner & Gill, 1994; Gigliotti, 1990; Morrone et al., 2001; Orr, 1992; Zimmerman, 1995). Morrone et al. (2001) note "teachers are failing to develop literacy by not integrating ecological concepts into other subjects...even if adults wanted to improve the environment, they will not know how because they lack basic knowledge about how the earth works" (p.35). And as Gigliotti (1990) concludes "we seem to have produced a citizenry that is emotionally charged but woefully lacking in basic ecological knowledge" (p.9).

The importance of teaching environmental knowledge is an important step towards fostering environmentally responsible behaviours. As Dresner and Gill (1994) note, "research shows that increased awareness and knowledge contribute to increased motivation to take action. Without knowledge of environmental issues and action skills,

however, it is unlikely that students will act" (p.35). If environmentally responsible behaviour is an end goal of environmental education then the acquisition of key environmental knowledge that facilitates the taking of action is necessary towards achieving this goal.

The argument has also been made that environmental education interventions that focus primarily on knowledge alone aren't enough (Ballantyne & Packer, 1996; Blum, 1987; Fouhey & Saltmarsh, 1996; Gigliotti, 1990; Iozzi, 1989a; Morrone et al., 2001; Orr, 1992; Palmer, Suggat, Bajd & Tsaliki, 1998; Volk, Hungerford & Tomera, 1984).

> When you understand all about the sun and all about the atmosphere and all about the rotation of the earth, you may still miss the radiance of the sunset. There is no substitute for the direct perception of the concrete achievement of a thing in its actuality. (Lord Alfred North Whitehead, as cited in Orr, 1993)

While it is recognized that knowledge is a critical component of environmental literacy, knowledgeable citizens are not necessarily environmentally literate citizens (Morrone et al., 2001, p. 34). According to the authors, an environmentally literate citizen must hold the necessary environmental skills and attitudes to transform knowledge into action (p.35).

> Knowledge alone is not enough; developers of environmental education curricula should focus on helping citizens increase knowledge, expanding awareness, and develop skills, which will allow them to participate in solving environmental problems (Volk et al., 1984 as cited in Morrone et al., 2001, p.34)

Similarly, Palmer et al., (1998) notes "that whilst the gaining of environmental knowledge is critical, so too are the attitudes and values passed on by those who

introduce pupils to this knowledge" (Conclusion, ¶ 3). An increase in environmental knowledge must be accompanied by an increase in environmental problem solving skills and environmental sensitivity.

Research conducted supports this notion. In their 1996 study of American high school students' environmental knowledge base of environmental issues, Gambro and Switzky found that although the "majority of the students were able to recognize basic facts concerning environmental problems... most students could not apply their knowledge to comprehend the consequences or potential solution related to the problem" (p.28). The authors utilized data compiled from the Longitudinal Study of American Youth (Miller et al., 1991), a survey originally designed to inspect middle and high school student's science and mathematics attitudes development and achievement. The authors concluded that while factual knowledge is important in understanding the fundamentals of environmental problems, knowledge alone will not allow for the prevention or solving of these problems.

Important to note is that for their study, Gambro and Switzky defined environmental knowledge "as a student's ability to understand and evaluate the impact of society on the ecosystem...demonstrated by recognizing environmental problems as well as comprehending the origins, implications, and consequences of those problems" (p.29). The author's definition of environmental knowledge did not appear to include basic ecological concepts (i.e. food chains, succession, etc.) nor did it identify knowledge of prevention strategies for future environmental issues or solutions towards existing environmental problems within its definition.

Other studies have also stressed the importance of environmental knowledge in conjunction with other variables for the creation of environmentally literate individuals. In their 2001 study, Morrone et al. developed a metric to measure the ecological knowledge of Ohioans. The authors begin their study by questioning which specific ecological concepts are required in order for an individual to be environmentally literate, and concluded with the emergence of eight principles that they consider to be important components for ecological knowledge (p.40). Prefacing their study, the authors presented a thorough literature review, which details the subject of environmental literacy, the variable associated with the development of an environmental literacy, and the role knowledge plays in developing an environmentally literate citizen. The authors conclude their review of the literature with the idea that ecological knowledge is only one component of environmental literacy, that values, attitudes and skills are also important characteristics of an environmentally literate citizen, that environmental values and attitudes has primarily been investigated within the ecological psychology field, and that the majority of measuring for ecological knowledge has occurred with the realm of environmental education (p.35).

Environmental Attitudes

As with environmental knowledge, environmental attitudes have been accepted as an important variable within the development of an environmentally literate citizen. According to Gall, Borg and Gall (1996):

> An attitude can be defined as an individual's viewpoint or disposition towards a particular 'object' that predisposes his or her actions. Attitudes are considered to

> have three components: affective (individual or emotional feelings about the attitude object); cognitive (the belief or knowledge about the attitude object); and behavioural/conative (the individual's predisposition to act towards the attitudinal object in a particular way). (p.273)

A great deal of research has been dedicated to the development of environmental attitudes (Albrecht et al., 1978; Dettermann & Pease, 1999; Eagles & Demare, 1999; Musser & Malkus, 1994; Richmond & Baumgart, 1981; Ryan, 1991; Schindler, 1999; Scott & Willits, 1994; Shepard & Speelman, 1986). Many studies have focused on both the development of environmental knowledge and environmental attitudes (Armstrong & Impara, 1991; Ballantyne, Fien & Packer, 2001; Bogner, 1998; Dunlap & Van Liere, 1978; Leeming et al., 1995; Leeming et. al, 1997; Keen, 1991; Kellert, 1998; Maloney & Ward, 1973) whereas others have included investigations of knowledge and/or attitudes within their investigations of several variables that contribute towards environmentally responsible behaviour (Culen & Volk, 2000; Jordan et al., 1986; Kaiser, 1998; Newhouse, 1990; Ramsey, 1993; Ramsey & Hungerford, 1989; Smith-Sebasto & D'Costa, 1995; Zelenzny, 1999). Other variables studied within these studies include environmental sensitivity and loci of control (both individual and group).

Environmental attitudes are important to study because similar to environmental knowledge, positive environmental attitudes are directly related to the development of environmentally responsible behaviour. "The development of environmentally sensitive attitudes in youth is seen as important to behaviour later in life" (Eagles & Demare, 1999, p.33). However, the relationship between knowledge and attitudes remains unclear, as does the relationship between environmental education interventions and the

development of environmental knowledge and positive attitudes. While some studies report an increase in the development of positive environmental attitudes as a result of exposure to formal and non-formal environmental education activities (Crater & Mears, 1981; Dettmann-Easler & Pease, 1999; Jaus, 1982; Leeming et al., 1997) others report no change in attitude amongst participants (Eagles & Demare, 1999; Gambro & Switzky, 1999; Gillett et al., 1991). In many circumstances a positive change in only one variable, either knowledge or attitude, but not both, was recorded (Armstrong & Impara, 1991; Gillett et al., 1991; Keen, 1991; Leeming et al., 1995). For example, in a study of environmental attitude change as a result of a multi-day camping experience on high-school students, Gillett et al. (1991) record no significant attitude changes. Similarly, Keen (1991) and Eagles and Demare (1999), in their individual studies of the effects of a Sunship Earth program on the attitudes of fifth and sixth graders, found little change in environmental attitudes measured. Alternatively, Dresner and Gill (1994), in their study of middle-school campers attitudes towards the environment following a multi-day program found an increase in levels of positive environmental attitudes. Dettmann-Easler and Pease (1999) whom studied attitudes towards wildlife after a residential environmental education program also report an increase in attitudes post-program.

Clearly the relationship between knowledge acquisition, positive attitudes, and the development of environmentally responsible behaviour is complex. As Iozzi (1989) concludes:

> Several studies showed a positive relationship between environmental knowledge and attitudes; others revealed no relationship at all, while still others showed a negative relationship between environmental knowledge and attitudes. The

> relationship between these two variables – whether positive, negative, or non-existent – seems to depend on the specific program studied. It would also seem that these studies support...that merely increasing knowledge of the environment is insufficient for inducing positive affective growth. (p.6)

It can be inferred that the nature of the program delivery method, program duration, content, instructor style, participant age, existing knowledge and attitude base, and environmental context of program delivery might all influence this complex relationship.

Non-formal Experiences and Knowledge and Attitude Formation

> I only went out for a walk, and finally concluded to stay out till sundown, for going out, I found, was really going in. John Muir

An examination of the literature reveals that a great deal of study has been dedicated to evaluating the effectiveness of using the natural environment as a learning ground (Dauber & Ream; 1980, Gillett et al., 1991; Shepard & Speelman, 1986). Some studies focus on the role of experiential wilderness learning as a means of increasing personal growth and development, resulting in positive behavioural changes (Bowlings & Williams, 1993; Sveen, 1993). Others have investigated whether there is an increased awareness of environmental problems and stewardship issues as a result of prolonged exposure to the natural environment (Dunlap & Hefferman, 1975; Hanna, 1995). And yet others studies have been investigated the impacts on environmental knowledge and environmental attitudes as a result of participation in outdoor and camp-oriented experiences. Environmentally favourable shifts in participants' attitudes have been found

after a number of extended outdoor adventure-education programs were evaluated (Andrews, 1978).

Outdoor environmental experiences are important in the development of environmentally literate citizens. As Bogner (1998) notes, "direct nature experiences are widely acknowledged to enhance environmental awareness and foster corresponding attitudes" (p.18). Through outdoor education participants experience direct, hands-on experience with nature. This first-hand experience allows for students to learn about key ecological principles such as ecological functions as well as practice environmental action skills and strategies. Through these experiences, the opportunities to develop environmentally responsible behaviours are awarded (Dresner & Gill, 1994).

> While learning about natural processes firsthand, campers gain greater familiarity with nature and achieve greater comfort in the wilderness. Evaluations...indicate that campers can learn environmental values and greater sensory awareness and achieve greater knowledge of ecological systems. Their understanding of concepts of interdependence and adaptations grows. And they learn outdoor skills with which to enjoy nature in low-impact ways (Dresner & Gill, 1994, p.35).

Certainly, the context in which non-formal environmental education curricula are delivered is diverse. Studies have included investigations of summer day camp programs, outdoor residential camps, wilderness/backcountry experiences, and conservation-based service learning experiences. Research has shown that many of these experiences have been important affecters on the environmental concern of participating students (Dunlap & Hefferman, 1975; Sia et al., 1985;, as cited in Bogner, 1998). An extensive literature review reveals that many studies support the belief that a wilderness

experience program can provide certain contingencies that encourage powerful and informative experiences (Ewart, 1983; Gillet et al., 1991; Hanna, 1988; Kellert, 1998; Riggins, 1986).

Of central focus to this study is wilderness or backcountry based programs that involve some component of environmental education in conjunction with service learning. However, little research that focused solely the roles of conservation-based service-learning programs within the backcountry setting was found. For this reason, studies that included residential camp experiences and wilderness/backcountry camping experiences are included. An examination of these programs still lends greater insights into backcountry service learning.

It is important to note that environmental education in a camp or wilderness/ backcountry setting is often referred to as outdoor education. For the purposes of this section of the literature review, the phrase 'non-formal outdoor education' will be adopted in referring to the collection of out-of-doors, non-formal environmental education interventions.

> Outdoor education is an experiential process of learning by doing, which takes place primarily through exposure to the out-of-doors. In outdoor education the emphasis for the subject of learning is placed on relationships, relationships concerning people and natural resources. (Priest, 1986, p.13)

Considerable research has been conducted on the effects of non-formal environmental education and outdoor education on the formation of environmental knowledge, attitudes, behaviours, and values (Carlson & Baumgartner, 1974; Christy,

1982; Dettmann-Easler & Pease, 1999; Emmons, 1997; Dresner & Gill, 1994; Gilbertson, 1991; Shepard & Speelman, 1986).

The opportunity to experience environmental learning within the wilderness setting can be a powerful event. As Miles (1986) notes, the wilderness experience can nurture "ones' sense of wonder and contribute to a necessary humility" (p.25).

> Both of these, as Rachel Carson so eloquently pointed out...are important for quality of life and for perspective on the human relationship to nature. In a wilderness place, immersed in the elements large and small of the natural landscape, one may listen to his or her thoughts, may become reflective and contemplative (Miles, 1986, p.25).

The length of time participants spend in the wilderness or backcountry setting has also been found to be of importance. Research undertaken indicates that programs of a longer duration (multiple days to multiple weeks) have been found to influence the impact of these experiences on the development and retention of environmentally responsible behaviours amongst participants (Bogner, 1998; Dettermann-Easler &Pease, 1999; Emmons, 1997; Hanna, 1988; Shepard & Speelman, 1985).

Indeed, full longer-term immersion can lead to greater impacts: "Gilbertson (1991) compared residential environmental education programs to other forms of environmental education programs and found the residential field experience provided the greatest gain in students' environmental literacy" (as cited in Dettmann-Easler & Pease, 1999, p. 34). Shepard and Speelman (1985) note that the length of time directly affects the extent to which positive environmental attitudes are formed. And similarly, Bogner (1998) notes that, when compared to one-day programs, a "five day program

explicitly provoked favourable shifts in individual behaviour, both actual and intended, a parameter that is generally seen as a complex and long-term process" (p.17). It could be inferred then, that programs such as the CCP, which involve multiple weeks of exposure to the backcountry environment, hold a powerful potential to foster in participants environmentally responsible behaviours.

However, it is dangerous to assume that just by 'being there' (i.e. in the outdoor or wilderness setting) that participants will naturally develop a stewardship ethic.

> An often-assumed benefit of wilderness adventure programs is that, by experiencing an environment in which the natural world dominates, trip participants will begin to care about the natural world...little research has been published about wilderness trip participants' perceptions of nature and subsequent environmental concern. (Haluza-Delay, 2001, p.43)

While it has been suggested that participation in outdoor programs of a sufficient duration can increase the levels of awareness surrounding the environment (Hanna, 1995), caution should be exercised in assuming that simply by participation in an outdoor based or backcountry program will result in a higher levels of environmentally responsible behaviour. "Outdoor education has always suffered from the commonly held belief that some intrinsic quality of the outdoors was inevitably educative" (Miles, 1986, p.38). In order for environmentally responsible behaviours to be fostered through the wilderness/backcountry experience, intentional efforts must be made.

Minimal research was found on the effects of longer duration wilderness education and outdoor education programs (>10 days) on the knowledge, attitudes, or behaviour. Research conducted on programs similar to the CCP in length and focus

generally tended to be either the subject of doctorate theses (Emmons, 1994; Hanna, 1988) or privately contracted studies (Kellert, 1998). Rather, most literature appeared to be dedicated to evaluating programs of a shorter duration (<10) days) (Bogner, 1998; Dettmann-Easler & Pease, 1999; Eagles & Demare, 1999; Jordan et al., 1986; Keen, 1991; Shepard & Speelman; 1985/86).

In a review of the literature pertaining to non-formal outdoor programs of shorter duration, but with findings still relevant to this study, several pertinent works emerged. Such is the study by Gillett et al. (1991), who attempted to determine the effects of a 6-day wilderness experience program on the self-concept, knowledge, and attitude towards the environment by senior secondary students. Using the Tennessee Self-Concept Scale, the Coopersmith Self-Esteem Inventory, and an attitude and knowledge questionnaire the authors surveyed participants pre-and-post program. The authors determined that "changes in...environmental knowledge can occur from short-term wilderness experiences" (p.33). They concluded with recommendations for further research into determining the qualities of programs that are effective in causing such positive changes in participants' and that "more studies...measuring changes in attitude and knowledge as a result of participation in wilderness activities" (p. 42) need to be conducted. Replications of the study, varying locations and program length, are suggested.

Similarly, Shepard and Speelman (1986), Eagles and Demare (1999) and Dettmann-Easler and Pease (1999) have all attempted to measure the impacts of short-term residential education experiences in the development of positive environmental attitudes. Each used a different attitudinal metric to assess the impacts of the programs on children's attitudes towards the environment. Shepard and Speelman employed a

Likert survey combining questions adapted from existing instruments to measure 9- to 14-year old campers attitudes at a 4-H summer camp; Eagles and Demare developed an attitudinal questionnaire with modified questions from Kellert (1997), and Eagles and Muffitt (1990) measured ecologistic, moralistic and general attitudes of sixth-graders at a Sunship Earth camp; and Dettmann-Easler and Pease utilized a Likert-based survey that measured attitudes towards wildlife amongst fifth-and sixth-graders at residential centres in Iowa, Wisconsin and Minnesota. Results from these studies are varied, with Dettmann-Easler and Pease reporting significant increases in the formation of environmental attitudes whereas Eagles and Demare accounted no measurable difference in attitudes. Shepard and Speelman reported little effect upon environmental attitudes. Reason for the difference in attitudinal shifts measured could include individual program curricula, age of camp participants, and levels of environmental attitudes held by participants before entering the camp. As Eagles and Demare note, students entered the Sunship Earth program with an existing moderate level of environmental experience, thus a lack in environmental attitude increases is not overly remarkable (p.37). Out of the three studies, only Dettmann-Easler and Pease reported the use of a control group.

Other studies involving short-term involvement in environmental education programs measured both environmental knowledge and environmental behaviours (Bogner, 1998; Jordan et al., 1986). In a 1998 study Bogner reported on the effects of one- and five-day ecology programs on the knowledge and attitudes development of students. Under this study, the researcher hypothesized that an "outdoor ecology education would be positively associated with pro-conservation attitudes and could provoke a significant (positive) shift in attitudes toward conservation and exploitation of

nature, and maybe in behaviour as well" (p.18). Through the use of a pretest and delayed posttest questionnaire designed to gather data pertaining to three attitudinal measures (environmental behaviour, utilization of nature, and conservation), plus environmental knowledge, Bogner gathered data from over 700 students. He concluded that the five-day program produced favourable shifts in both actual and intended individual behaviour.

Another study that examined both knowledge and attitude within the context of measuring for environmentally responsible behaviour within limited duration non-formal education programs is that of Jordan et al. (1986). The authors hypothesized that participants who were subject to both issues and action information would engage in a greater number of environmental behaviours (p.16). Through the use of two instruments designed to gather knowledge of environmental action and personal environmental actions taken (pretest and posttest) and self-reported environmental behaviour (delayed posttest), the authors measured high school students involved in six different multiple day outdoor programs. Unique to Jordan et al.'s study, half of the students involved in the study received environmental awareness education; the other half received environmental awareness in conjunction with action strategies education. The authors concluded that students that received instruction in both environmental issues and action strategies were more likely to demonstrate environmentally responsible behaviour.

One minor criticism of Jordan et al.'s work is that, despite reporting that participants stated increasing 'environmental-type actions' subsequent to the programs, these conservation behaviours were not explicitly defined. It could be inferred that the programs motivated the students to only participate in stewardship actions that they were either familiar with or did not require a significant amount of effort (p.20). This could

question the amount of change promoted within the students as a result of their participation in the programs. As well, the study really only measures reports of stewardship behaviour, not the behaviour per se. Despite these criticisms of the study, Jordan et al.'s work demonstrates support for programs such as the CCP that attempt to expose participants to both environmental knowledge and concrete stewardship ideas. Whether the CCP achieves these goals is another question.

Three key studies that included investigations of the effects of longer duration environmental education programming on the development of environmental knowledge and attitudes are those of Emmons (1994), Hanna (1988), and Kellert (1998).

In a doctoral thesis Emmons (1994) tests a model for environmental education for a non-formal, field environmental education program in Belize. Emmons proposed an *Interactive Model of Positive Environmental Action*, which emphasized positive environmental action as an educational goal; treats positive environmental action as an integration of cognitive, affective, and action factors; has multiple student learning goals; and integrates the cognitive, affective, and action domains within a non-formal, field setting (p. 9). Utilizing this model, Emmons gathered qualitative and quantitative data from high-school aged female Belizeans in an attempt to explore the interrelationships between environmental concept comprehension, environmental sensitivity and attitudes, action skills, empowerment, and recreation (p.22-23). Two different forms of the model were tested: a tacit form (less intense instruction) and an explicit form (more intense instruction). Emmons determined that while both groups achieved positive results, the group that received the explicit programming demonstrated more consistently positive results (p.319). Emmons concludes with a discussion of the relevance of the study

findings in light of the Tbilisi objectives for environmental education (awareness, knowledge, attitudes, skills, and participation) and the general concept of environmental action.

Emmons' study holds several important implications towards the current research. Her investigation and recognition of the importance of environmental action learning is important, as research has shown that students that receive and participate in environmental action instruction engage in environmentally positive behaviours (Jordan et al., 1986). Similarly, Emmons' utilization of both qualitative (interviews and participant observations) and qualitative (questionnaires) allows for a diverse amount of data to be gathered, thus lending scope and depth to her findings. A similar technique was employed in the current research study.

However, as Emmons herself notes in a later article summarizing her study, "the question remains as to whether the students would continue to seek out opportunities for action after the end of the program. There was no guarantee that long-term environmental participation would ensue" (p.40). Without the presence of on-going support designed to motivate students to build on newly learned environmental action skills and reinforce environmentally responsible behaviour, the long-term impact of such a program remains questionable. A need for additional case studies that investigate the environmental action within environmental education activities is recommended.

A second study, which bears great relevance to the current research, is that of Glenda Hanna (1988), whose doctoral thesis focused on examining the effects of an adventure and ecology education program on participants' knowledge, attitudes, intentions, and behaviours. Within this study, Hanna compared two adult-oriented,

longer duration outdoor programs: Outward Bound and the Audubon Society. Using a model of Reasoned Wilderness Behaviour (adapted from Fishbein & Ajzen, 1975), which attempts to explain the relationship between participants' predisposing knowledge of environmental issues, their intentions and their actions, Hanna attempted to examine the role of predisposing factors in conjunction with environmental cognition in the development of positive environmental attitudes. She evaluated environmental attitudes towards wilderness along a spectrum, from anthropocentric (wilderness should be preserved as a venue for outdoor recreation and similar utilitarian activities) to ecocentric (we should preserve wilderness for environmental conservation reasons) (p. 250). Both qualitative (observations, interviewing) and quantitative data (questionnaires) were gathered. Her conclusions were that, while there are few differences between Outward Bound and Audubon participants in terms of both post-program intentions and involvement in wilderness related activities, differences between sub-programs analyzed yield many differences. Further, individuals "exposed to either field ecology or adventure education programming change with respect to what they know about the natural environment...and how strongly they feel about its preservation" (p.251). Hanna stresses the need for such programs to link such environmental awareness and self-concept with concrete stewardship tasks and the development of decision-making capacities, and that without such a link wilderness education programs fall short of their mark. "Without more attention to the attitudinal and behavioural outcomes (in such programs) the very environment upon which the experience depends will be destroyed" (p.251). She recommends that both programs of a longer duration be examined under

similar circumstances, and that the curriculum for outdoor programs be developed under a more rigorous theory-based approach (p. 253-254).

Hanna's findings are relevant to this research study for her work identifies not only the need for greater attention to be given to the proposed education objectives promoted by the CCP, but also the need to 'connect' these objectives to active learning – that to have the introduction of ecological information into a wilderness education program is not enough; but rather the demonstration of how to apply that knowledge to a situation is necessary. As Hanna notes, the need for more research involving the investigation of the designated environmental outcomes of wilderness education programs remains (p.22); this supports the inquiry of this study towards the CCP.

Perhaps most relevant of all towards this research study, is Kellert's (1998) examination of the impact of outdoor wilderness experience. As the author notes, the primary objective of his study "is not the environmental impact of outdoor recreation but rather the affect of the outdoor experience on the participant" (p.7). In this inclusive and detailed study, both a longitudinal study and a retrospective study were conducted. The retrospective study focused on an examination of the affects of participation on respondents' environmental knowledge, behaviour, and attitudes (p.17); the longitudinal study consisted of three surveys: a pretest deigned to measure past experience and anticipated affects, and identical post-tests and delayed post-tests (p.70). In addition, a selected number of interviews were held with participants for the longitudinal study. Three national organizations constituted the focus for this study: Outward Bound (OB), the National Outdoor Leadership School (NOLS), and the Student Conservation Association (SCA). Early in the study, Kellert makes the important distinction between

the nature of the three different organizations that are being studied, noting that these difference make the capacity to make generalizations and comparisons difficult (p.11). For example, while SCA focuses more on service learning, OB and NOLS focus more on outdoor experiential education. In particular, the author notes that, due to the decentralized, autonomist nature of Outward Bound, study results would be more difficult to apply (p.11).

Overall, this is a comprehensive study that examined a wide range of possible impacts on the outdoor wilderness experience, including: environmental awareness and knowledge; environmental attitudes and ethics; career choice and community service; outdoor recreational interests, activities and skills; personal values and beliefs; interpersonal relationships; critical thinking and problem solving; self esteem and self concept; academic interests and performance; and physical fitness and well-being (p. 9-10).

As even the author acknowledges, this was a large-scale study, which may have compromised the results that could have been gained from research of a "more in-depth, detailed and precise" manner (p.169). However, several important conclusions were drawn that lend great insight into the role of the outdoor experiences in the development of environmentally literate individuals. As the researcher notes "prolonged and challenging immersion in the outdoors, especially in relatively pristine settings, can exert a powerful physical, emotional, intellectual and moral-spiritual influence on young people" (p.169).

Although both the longitudinal and retrospective study results were well detailed in lengthy individual chapters, the authors provided a much-appreciated results summary

that re-captured their findings. In regards to the knowledge and attitudes component of the study, the researchers reported that "SCA participants surveyed revealed the greatest impacts on environmental knowledge and behaviour, particularly conservation activity, service, and career interest" (p. 174). However, the authors ultimately concluded that each of the programs had a:

> Marginal affect on participants' environmental knowledge and behaviours...only limited improvements in factual knowledge...we rarely observed greater environmental awareness and appreciation being accompanied by deeper understanding of ecological structure and process...we also encountered few major changes in conservation behaviour...(and) initial increases in conservation activity and environmental stewardship often diminished over time since program participation (p.184-185).

Despite these rather unsatisfactory findings, the authors conclude that each of the organizations studied hold the potential to play a powerful role in the development of environmentally literate individuals. On the whole each program had a positive affect in the personal and character development of its participants (p.185). As well, the majority of participants did indicate "an increased appreciation, awareness, and concern for the natural environment and its conservations" (p.188) as a result of their participation. What is needed is a revisiting of the objectives of, and methods and strategies for delivering environmental education within these programs so that a greater degree of environmentally responsible behaviour is fostered to their participants.

On a final note, it is relevant to the current study that the author notes that little systematic research had been conducted to date on SCA: "this lack of sufficient and

rigorously derived data has been particularly evident in the case of the Student Conservation Association" (p.6). A need to further analyze the relationship of knowledge and attitudes within the SCA's programs, including the CCP, as well as the need to examine the effectiveness of environmental literacy development amongst it's participants, is required. As Kellert concludes, a "far more in-depth and focused study will be needed before we fully understand the impacts of this experience, and how we can more effectively incorporate its full potential into more conventional educational systems and curricula" (p.190). Methods used in this study, including instrument development and nature of the research questions, were influential in the development of the current research study.

The Importance of Service Learning

Service learning within the environmental context is often referred to as conservation work or ecological restoration. "Ecological restoration is a set of activities directed toward reinstating and managing, and thus restoring, the integrity of compromised ecological systems (Clewell, 1993, pp. 206-207 as cited in Bowler, Kaiser, & Hartig, 1999). Service learning can be a powerful model for effectively involving individuals to environmental education initiatives. As Chawla (2001) notes, service learning experiences "engage young people in an understanding of what has happened, why, and how constructive action can prevent it from happening again" (p.459). Fouhey and Saltmarsh (1996) provide a strong argument for the inclusion of service learning in relation to the development of beliefs held towards the environment:

> The service-learning model provides a theoretical framework of cognitive and moral development as well as a context of experiential learning theory through which to interpret Outward Bound's educational approach. It addresses the primacy of affective development as a prelude to and component of cognitive development (p.85).

However, the majority of the research found is focused on non-formal, outdoor or environmental education programming delivered through residential camps or backpacking programs (such as Outward Bound), with little, if any, attention given to the concept of service learning. A lesser amount of research has examined the impacts of service-based environmental education projects on individuals' environmental knowledge, environmental attitudes, and environmentally responsible behaviours. Three studies with direct relevance to the current research project are those of Driver and Johnston, 1989; Booth, 1998; and Bowler et al., 1999.

In their 1988-1989 study Driver and Johnson reported on the results of a pilot study investigating the possible long-term benefits of the Youth Conservation Corps (YCC) program, a wilderness service-oriented education program. For the purposes of their study, the authors categorized the possible benefits of the YCC, which they reported as follows:

> Increase environmental awareness and appreciation; improved work attitudes, habits and skills; improved ability to get along with others; increased self-confidence; and improved basic orientation to life (e.g. education and career objectives) (p. 3).

These YCC benefits share substantial similarity to that of the CCP. The authors used questionnaires as the main means of data collection, and these were distributed to a selected number of participants and parents of participants, of both former and current programs. The researchers concluded that overall, "the YCC enrolees benefited...(by) becoming much more environmentally aware...had considerably improved work skills and habits...and had developed an increased ability to work with others and held greater self-confidence" (p.10). The authors concluded that their findings hold significance from the practical perspective that identifying benefits will help administrators not only evaluate the effectiveness of the YCC program in meeting its overall goals, but also help them determine how the program can be improved to provide a wider variety of benefits (p.11).

Although the research was conducted in the spring of 1978, the report was not published until 1989, eleven years later. It can be questioned whether the data gathered, and the conclusions drawn, were 'dated' after such a long period between research and publication. Additionally, the researchers evaluated their data based on the benefits as listed above. Program administrators and members of the research team developed these benefits. "Benefits were defined as any changes in the enrolee's attitude, skills, or behaviours which were judged to be desirable by the researchers and administrators" (p.3). No consideration was given to participant opinion as to what they though the possible benefits of the program might be, even though they were the very user group for whom the program was developed. A final criticism of the study regards the researcher's test for bias. A low response rate of the questionnaires prompted the researchers to hold 'informal' telephone surveys with non-respondees, asking them about their general

opinion of the YCC. It could be argued that, unlike within an 'anonymous' questionnaire form, these participants felt greater social pressure to respond favourably to opinion-based questions when asked personally. Furthermore, the questionnaire itself was based on a seven-point response format, which even the authors concluded the telephone participants found difficult to visualize when responding, and thus often gave indefinite results.

However, despite these criticisms, the authors provided valuable insight into the effectiveness of one particular wilderness education program. They determined that changes in both self-concept and environmental knowledge which leads to an increased stewardship ethic are often the results of a wilderness education program. Their work is supported by the findings of other researchers such as Dresner and Gill (1994), who through similar research determined that wilderness camp settings can "contribute to a positive change in participant self-esteem, an increase in the environmental awareness...and that this enhanced self-esteem is a major influence on the desire to take further environmental action" (p.35). Both studies concluded with the identification of a need for more systematic research on the benefits and effectiveness of similar programs, especially those dealing with conservation work.

A second study of relevance concerning service learning is that by Bowler, Kaiser and Hartig (1999) who examined the effects of service learning, or what they term 'ecological restoration field work', in combination with in-class instruction on college student's ecological behaviour and attitudes. Several evaluation criteria were used including that of a demonstrated change in ecological behaviour. In order to support their approach, the authors argued that ecological restoration work:

> Targets students' energies on a particular, local environmental problem with the promise of a readily identifiable outcome; it allows them to directly experience their role in an ecological process...(which) leads them to make the step from possible behaviour intentions to a form of ecological behaviour; and in the process it may engender psychological benefits that encourage continued involvement. Ecological restoration fieldwork thus affords educators possibilities for influencing factors thought to mediate the relationship between environmental education and ecological behaviour: environmental knowledge and values, behaviour intentions, and the perception of restorative qualities in a natural environment (p.20).

Utilizing a measurement tool that examined knowledge, values and behaviour intentions, the authors' surveyed college-level students enrolled in one of three biological or social ecology course (Restoration Ecology; Limnology and Freshwater Biology; and Introduction to Environmental Analysis). One of the courses involved students' engagement in restoration fieldwork; the other two served as controls. The authors concluded that "ecological restoration work positively affected environmental attitudes and ecological behaviour, but within the attitude measures it affected only ecological behaviour intention and not environmental knowledge or environmental values" (p.19). Students that had participated in the course in which restoration fieldwork was a component indicated a greater involvement in general pro-ecological behaviours. However, the authors do acknowledge that it could be argued that the students that participated in the restorative field work were influenced by their participation in the

restoration ecology course, which would, by nature of its content, be expected to teach students a greater amount of positively-oriented ideas and environmental behaviours.

Summary

An enormous amount of attention has been given to the roles of environmental attitudes and environmental knowledge in the development of environmentally responsible behaviours. These studies have been divided amongst both formal and non-formal interventions. A great deal of the literature reviewed holds findings that are directly relevant to an investigation of the CCP and the endeavours of the CCP in increasing the effectiveness of environmental education within its operations. Conservation-focused service learning, which holds the unique advantage of incorporating many of the variables, which together constitute environmentally responsible behaviour (knowledge, awareness, attitude, skills, and action), can be an effective means of helping to develop a citizenry that is both ecologically literate and environmentally responsible. It has been noted that an over-emphasis on one component of environmentally responsible behaviour (i.e., a focus on knowledge and awareness over attitudes and skills) can limit the development of an ecologically literate individual. Similarly, without a proper knowledge base in which to base beliefs, decisions and attitudes, environmentally responsible behaviour can also be restricted. The need to consider multiple components is thus necessary if the goal of an environmental education program is to foster environmentally responsible behaviour.

CHAPTER THREE

METHODS

The purpose of this study was to: assess the impacts of an outdoor conservation-based program on participants' environmental knowledge, environmental attitudes, and environmental skills; examine the draft goal statement and objections for environmental education of the Student Conservation Association (SCA) in light of participant experiences; and contribute recommendations for future directions for SCA towards incorporating environmental education into their programming more effectively.

This chapter describes the following methodological features of the study: (a) the research design, (b) experimental treatments, (c) instrument development, (d) procedures for administering the instruments and, (e) treatment of the data. Quantitative and qualitative data collection, and analysis methods are described separately.

Research design

As noted in Chapter One, the research design for this project consisted of the use of a case study format. For this research study, the case is defined as the CCP, the focus was on examining the effects of the CCP on participants' environmental knowledge, attitudes, and skills, and the units of analysis were the CCP participants themselves.

The CCP represents an ideal example of a case study, for given the nature of the program's structure, it can be considered to be a bounded system. In addition, the means of collecting data to evaluate this study also fall within the parameters of a case study. According to Yin (1994) "the case study's unique strength is its ability to deal with a full

variety of evidence – documents, artefacts, interviews and observations" (p.19). In addition, Merriam (1988) notes a further characteristic of case study research is that it involves fieldwork, where "one must physically go to 'the field' in order to observe behaviour in its natural setting" (p.19). Both the need for a full variety of evidence and a need for fieldwork can be satisfied by the CCP.

As previously noted, data for this study were collected before, during, and after the program. Data gathering comprised both qualitative and quantitative research methods. In regards to the collection of both qualitative and quantitative data, Hillcoat and Forge (1995) offer a convincing case for using both research methods. As the authors note, there is the dilemma of "transferring particular questions from questionnaires constructed in different places, cultures and times in an attempt to develop comparative data" (Research Assumptions, ¶ 7) within the context of measuring environmental knowledge and behaviour. While quantitative methods offer a broader understanding of individual's knowledge and attitudes, qualitative methods give greater insight into the complexities that underlie this knowledge and attitudes (1995). The authors indicate that the utilization of both methods are greatly complementary, with the results of qualitative research being able to expand upon the results of qualitative research, and that ultimately this will result in a richer understanding of the attitudes and behaviours being studied (1995). Several studies have employed the use of both qualitative and quantitative data collection methods (Emmons, 1994; Hanna, 1988; Hillcoat & Forge, 1995; Kellert, 1998).

In conjunction with the utilization of a case study format, the research design for this project also adopted an interpretive study design. According to Cantrell (1990):

> The research design for an interpretive study begins as a broad outline of contingency plans open to change throughout the study. An emphasis on an emergent design and researcher flexibility characterize this approach. Plans, research questions, theories, data collection strategies, and analysis all evolve from the beginning point as the researcher learns more about the people, places, events and processes which are the focus of the study (Research Design, ¶ 2).

The use of the interpretive study design allowed for a richer understanding of the environmental education within the CCP context.

Data collection methods included questionnaires, interviews, and, to a lesser degree, participant journals. Questionnaires were utilized to collect quantitative data and qualitative data. Two questionnaires were applied, one within the first two days of the program, and a second on the last day of the program. Each instrument consisted of questions adapted from existing instruments as well as questions designed specifically for this study, and included sections that assessed a combination of: environmental knowledge; environmental attitudes; environmental skills, environmental opinions; environmental empowerment; participant expectations; student perception of environmental education; and/or previous participant experiences. These instruments are described in greater depth in a subsequent section of this chapter.

All 34 participants that were originally contacted and that agreed to participate in the study completed a pre-test questionnaire. During individual programs, participant attrition resulted in 26 completing the post-test questionnaire and 32 participating in interviews. As well, 22 participants returned journals to the researcher at the end of their program.

Contacting Respondents and Permission

All subjects were contacted prior to study commencement. The CCP's Director sent an initial letter on behalf of the researcher to the parents and/or guardians of the prospective participants. This letter introduced the significance of the study to the SCA, outlined the relationship of the researcher to the SCA, and summarized the means of data collection to be employed. A copy of this letter is contained within Appendix B.

Following this introductory letter, an introductory letter was sent to each participant. This letter outlined the purpose of the study, the role of the participant, specifics surrounding participant anonymity, confidentiality and opportunities to withdraw from the study, and provided researcher contact information. The introductory letter was written by the researcher in conjunction with SCA staff and was sent on SCA letterhead. A copy of the introductory letter can be found in Appendix C.

Next, an email was sent to each potential participant, asking them to confirm they had received both the parent and participant directed letter. An invitation for participants to respond with questions pertaining to the study was also offered. Following this, a telephone call from the researcher verifying understanding and willingness to participate in the study was made. During this call the process for data collection was further documented with the participants. As well, general questions surround the CCP, the research study, and the researcher's background were answered.

Environmental Training Workshop

An environmental education workshop was held at the Western Spring Training meeting near Seattle in May 2002. The primary objective of training was to ensure that all crew leaders, regardless of personal backgrounds, had a standardized level of environmental education training that was aligned with the CCP's draft environmental education goal statement and objectives. Over the course of one weekend, three training workshops were held. Each workshop, conducted by the researcher, lasted for approximately 2 hours. The objectives of the workshop included: introducing crew leaders to the draft goal statement and objectives of the CCP; assisting crew leaders in developing their own personal 'toolbox' of ideas, approaches, and teaching methods for teaching environmental education within the context of the CCP; and facilitating the sharing of knowledge for delivering environmental education within the CCP amongst crew leaders. Leaders of crews that were to be participating in the study were required to participate in these workshops.

Quantitative Data: Questionnaires

As noted previously, two questionnaires were administered: a pre-test questionnaire and a post-test questionnaire. These were designed to monitor shifts in the subscales surveyed, using a combination of Likert-based and open-ended questions. Each questionnaire assessed a combination of: environmental knowledge; environmental attitudes; environmental skills; environmental opinions; environmental empowerment; participant expectations; student perception of environmental education; and/or previous

participant experiences. Several of the pre-test and post-test measures were taken with the same test instrument.

In order to develop each instrument, a number of steps were undertaken. First, as part of the literature review, existing instruments that investigated topics relevant to the research study were collected and reviewed. A combination of existing inventories was utilized to develop the questionnaires (Bradley, 1995; Bradley et al., 1999; Hanna, 1988; Keen, 1991; Kellert, 1998; and Leeming et al., 1993). From these studies selected questions and/or instruments that were applicable to the proposed research study were adapted and/or adopted. In addition, the researcher developed a number of questions. These included environmental knowledge (one question), participant expectations (five questions), perceived knowledge change (one question), environmental skills (six questions), and perceived environmental attitude change (three questions). Following this, both the adapted and the researcher-developed questions were formatted into pre-test and post-test questionnaires.

The eleven-page pre-test questionnaire consisted of 6 sections: (1) participant information (demographic information), (2) past experience, (3) level of environmental knowledge, (4) environmental attitude, (5) environmental opinion, and (6) expectations held.

Within the environmental knowledge section, a variety of questions designed to measure ecological concepts were asked. Examples of these questions include: "The most stable natural communities are those with the greatest _____? (a. variety of plants and animals; b. number of acres; c. number of small organisms; or d. number of rivers and streams); and "The part of the soil that acts as a sponge to hold water in place is the

__? (a. inorganic matter; b. mineral matter; c. organic matter; or d. sedimentary matter)". The environmental attitude inventory included items such as "I think we need to develop oil resources in places like the Arctic National Wildlife Refuge" and "Industries should be held financially responsible for any pollution they cause".

One additional question on the pre-test questionnaire asked if environmental education should be an important part of the CCP. Three check boxes (Yes, No, and Don't Know/Unsure) and room for comments/explanation was provided. A complete copy of the pre-test questionnaire can be found in Appendix D.

The eleven-page post-test questionnaire also included six sections: (1) level of environmental knowledge, (2) environmental attitude, (3) environmental opinions, (4) perceived knowledge change, (5) skills, and (6) perceived attitude change. Four additional questions were included on the post-test questionnaire. The first question, developed by the researcher, asked if environmental education had been an important part of the program. The second question, adopted from Kellert, 1998, asked if participating in the Conservation Crew Program had made crew members significantly more aware of the environment. A third question, modified from Kellert, 1998, investigated whether participants' feelings of responsibility had been affected by participating in the program. The fourth question, also developed by the researcher, asked crew members to describe their most memorable environmental experience during the program. Three check boxes (Yes, No, and Don't Know/Unsure) and room for comments/explanation was provided for each question. A complete copy of the post-test questionnaire can be found in Appendix E.

Questionnaire Inventories and Scales

The primary function of the questionnaires was to analyze for a change in the environmental knowledge and attitudes of participants in the CCP. In addition to knowledge and attitudes, general participant information, past experience, opinions, expectations, and skills were also measured.

The pre-test questionnaire included a participant information section that consisted of five biographical/personal background questions regarding gender, age, grade level complete, number of SCA programs previously participated in, and home area description. The demographic data collected in this section helped to describe the sample.

Also included in the pre-test questionnaire was a past experience section that included eight questions related to past experiences in regards to time spent in the environment, exposure to environmental education, and participation in environmental activities. The data collected here also helped in describing the sample.

Knowledge was measured on both pre-test and post-test questionnaires. This section of the instrument consisted of 15 multiple-choice knowledge inventory questions. The knowledge inventory was developed using a combination of existing measurement scales. Questions used to test knowledge about the environment were adopted and/or adapted from instruments in the following studies: Hanna, 1988; Leeming et al., 1995; Kellert, 1998; and Bradley et al., 1999. In addition, one question was developed and added by the researcher. The resulting knowledge inventory was designed to be a measure of 'general' environmental knowledge as related to the draft objectives outline

by the CCP. Questions were selected because of the quality of their construction and validation, and because of their relevance to the CCP. Correct responses to the 15 knowledge questions were credited one point; incorrect responses were credited zero points. Thus, scores had the potential to range from 0 to 15.

Attitude was also measured on both pre-test and post-test questionnaires. The attitude inventory was developed using a combination of existing measurement scales (Bradley et al., 1999; Hanna, 1988; Kellert, 1998) that were developed to test attitudes held towards the environment. Questions were selected because of the quality of their construction and validation, and because of their relevance to the CCP.

This section of the instrument consisted of twenty attitude inventory questions that measure attitudes towards the environment. The twenty questions were presented in a five-point Likert scale, a commonly used form of collecting attitudinal responses (ref). Each attitude statement required participants to choose one of five responses: A= Strongly Agree, B= Agree, C=Neutral, D=Disagree, E=Strongly Disagree. For scoring, each attitude question was assigned a score ranging from one to with five representing the strongest agreement with the expressed attitude. The most pro-environmental response to each item was credited five points, and the least pro-environmental response received one point credit. Thus, scores on the attitude scale spanned from 20 to 100, inclusive. Nine questions were negatively connoted and thus reverse coded to reduce the possibility of patterned response. See Appendices D and E for a complete set of Attitude Inventory Items.

Participants' environmental opinions held towards environmental problems were also measured on both the pre-test and post-test questionnaires. An opinion inventory

originally developed by Kellert (1998) in a longitudinal study designed to measure the impact of outdoor wilderness experiences on the participant was adopted for this study. Opinions were included in the data collection methods, as "measuring environmental opinions also identified one component of the environmentally literate citizen" (Morrone et al, 2001, p.37)

This section of the instrument consisted of ten environmental opinion questions that measured participant's opinions of different environmental problems. An example of an opinion statement asked is "Species endangerment and extinction". Each opinion statement, presented in a Likert scale, required crewmembers to choose one of four responses: A= Very Serious, B= Somewhat Serious, C=Not Very Serious, and D=Not Serious At All. To deal with a possible lack of familiarity with a topic, a fifth response, E=No Opinion, was included. The most pro-environmental response to each item was credited five points, and the least pro-environmental response received one point credit. Thus, scores on the opinion scale can range from 20 to 100, inclusive. See Appendices D and E for a complete set of Opinion Inventory Questions.

Expectations pertaining to environmental learning were measured on the pre-test questionnaire. Five questions designed to gain insights into participants' expectations about both the types and amounts of environmental education to be learned during the CCP were asked. Questions investigated expectations that students held towards the prevention and solution of environmental problems, expectations held for increased motivation toward solving environmental problems and expectations held for increases in appreciation for nature as a result of participation. An example of an expectation question is "Because of this program, I expect that I will gain a greater appreciation for

nature". Each expectation statement, presented in a five-point Likert scale, required the respondent to choose one of five responses: A=Strongly Agree, B=Agree, C=Neutral, D=Disagree, E=Strongly Disagree. The frequency of responses was counted in these categories: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree to measure expectations pertaining to environmental learning.

Fifteen questions on the post-test questionnaires were designed to measure a shift in participants' perceived environmental knowledge. The perceived environmental knowledge inventory used was adopted from Kellert (1998). Questions were selected because of the quality of their construction and validation, and because of their relevance to the CCP. In addition, the researcher created one question, designed to measure participants perceived knowledge to help the environment.

Each perceived knowledge statement, presented in a Likert scale, required crewmembers to choose one of four responses: A=Very Much, B=Moderately, C=A Little, and D=Not At All. To deal with the possibility that the question area was not applicable to a particular CCP, a fifth response, E=No Opinion, was included. The frequency of responses was counted in these categories to measure expectations pertaining to perceived environmental knowledge. Examples of perceived knowledge statements include "General awareness of the natural environment" and "Knowledge of past and present land use". A complete set of perceived knowledge statements can be found in Appendix E.

On the post-test questionnaire participants were asked to assess whether their participation in the CCP had taught them any new skills for minimizing their impact on the environment, or for helping the environment. Six statements designed by the

researcher, recorded students' assessment of skills development. Statement topics included identification and application of Leave No Trace principles; backcountry cooking; environmental restoration; map and compass use; and low impact travel. An example of a skills statement as is "As a result of participating in the CCP I now feel confident I can use a stove to cook meals in the backcountry". Each question, presented in a five-point Likert scale, required student to choose one of five responses: A=Strongly Agree, B=Agree, C=Neutral, D=Disagree, E=Strongly Disagree. The frequency of responses in these categories was counted: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree to measure expectations pertaining to environmental skills. A complete set of skills statements can be found in Appendix E.

Six questions on the post-test questionnaires were designed to measure a shift in participants' perceived environmental attitudes. The perceived environmental attitude inventory used was adopted from Kellert (1998). As well, the researcher designed three additional statements. Statements adopted from the Kellert study were selected because of the quality of their construction and validation, and because of their relevance to the CCP. Each question, presented in a five-point Likert scale, required student to choose one of five responses: A=Strongly Agree, B=Agree, C=Neutral, D=Disagree, E=Strongly Disagree. The frequency of responses in these categories was counted to measure expectations pertaining to perceived attitude change. An example of a perceived attitude statement is "Because of this program, I feel more responsible for conserving and protecting nature". A complete set of perceived attitude statements can be found in Appendix E.

Following the development of the instrument tools, content and face validity of the instruments was established by submitting a copy of both questionnaires, along with the research questions utilized in this study to the following key individuals: to CCP staff; to a panel of practicing professional environmental educators; and to a selected sample (n=5) of previous CCP students for review. These key individuals were also asked to comment on whether the instruments' questions accurately represented the characteristics that they were intending to measure. Their reports back indicated that the data that would be obtained by the items would answer the research questions that were being asked. Feedback obtained was implemented into revised instruments. Content validity judgements were also based on comparisons of test instruments with appropriate CCP objectives. The previous researchers from whose studies questions had been adopted also established reliability and validity. Reliability was further established through the piloting of the instruments.

Questionnaires were then piloted using a representative sample. Seven youth (four females, three males) of similar age to those that participate in the CCP's were asked to complete each questionnaire. The researcher contacted these individuals, members of a Victoria-based youth organization. The pilot questionnaires were administered to the pilot participants in a group setting, after school, in the boardroom of a local non-governmental organization. On average, most participants required approximately 35 minutes to complete the questionnaire. Following their completion of each questionnaire, each participant was asked to re-read both the questionnaire instructions as well as the questionnaire itself, noting any areas of inconsistency, confusion, or need for further clarification. A group discussion was then held, with

feedback on the questionnaire format, language, and content elicited by the researcher. In addition, each pilot form of the questionnaire provided space for respondents to make criticisms and recommendations towards improvement, as well as to highlight confusing terminology. All feedback was then implemented into the final version of the questionnaires. These included minor revisions were made to improve ease of student testing and for clarification of selected terminology. Final questionnaires were then printed and prepared for dissemination.

Procedure: Questionnaire Dissemination and Collection

The design of the study called for questionnaires to be administered twice to each subject; once within the first two days of their CCP; and again on the last day of their CCP. CCP crew leaders administered both questionnaires.

Pre-test questionnaires packages were distributed to crew leaders of participating crews during the Western Training Meeting, held May 31st to June 2nd 2002, near Seattle, Washington. Included in these packages were: copies of pre-test questionnaires for each participant, participant consent forms, dissemination and collection information, and collection envelopes. The researcher distributed to crew leaders post-test questionnaires during scheduled program visits. For post-test questionnaires, crew leaders were provided with a return addressed envelope and money for postage. Post-program questionnaires were returned to the researcher via the SCA CCP Seattle-based office.

Questionnaires were distributed to 34 crewmembers in total. The time of the questionnaire administration ranged between June and August 2002, depending on when each CCP occurred. Questionnaires were distributed within the first two days of

participant's programs, and again on the last day of the CCP. Tests were administered during the first two days of program and then again on the last day of the program in order to ensure for consistency amongst crews and amongst data collected.

Both pre-test and post-test questionnaires included a cover letter, which explained the purpose of the study, the importance of their participation, researcher contact information, and the reassurance of confidentiality, anonymity and the option to withdraw at any time. As well, each questionnaire also included an Instruction and Coding Page (Appendix D and Appendix E). Here, each participant was directed to code the questionnaire with a four-digit code number comprised of his or her birth day and month. Participants were also instructed to read the instructions at the beginning of each section of the instrument, and on what to do with their questionnaire upon completion. In order to ensure anonymity, students were instructed not to sign their name anywhere on the questionnaire. Following completion, each student folded and sealed their questionnaire in a provided envelope; these envelopes were then collected by the crew leaders and placed inside a master envelope, which was either collected by the researcher during the field visit, or alternatively mailed back to the researcher post-test. Consent forms were also distributed with each pre-test questionnaire (Appendix F).

In total, thirty-four pre-test questionnaires were distributed and thirty post-test questionnaires were distributed. Participant attrition resulted in a lower number of post-test questionnaires being distributed. Thirty-four usable pre-test questionnaires (100%) and 26 usable post-test (76%) were returned. Because questionnaires were anonymous, follow-up amongst non-respondents was not an option.

Qualitative Data: Interviews and Journals

Qualitative data collection methods for this study included the use of interviews and participant journals. Interviews were utilized to collect the majority of qualitative data for this research study. Ranging in length from one to two hours in duration, each interview was conducted in effort to gain greater insights into the research topics. The interview procedure consisted of a semi-structured process, allowing for open-ended responses to pre-set questions. A semi-structure process was selected because it is "reasonably objective while still permitting a thorough understanding of the respondent's opinions and the reasons behind them" (Gall et al., 1996, p.452). In addition, open-ended questions best support the objectives of naturalistic research (Lincoln & Guba, 1985). Open-ended questions allow flexibility to be retained while the interviewer probes deeper into specific topic areas, allowing for additional information to come to light. Thus, the interview process was designed to probe participants for a deeper understanding of their environmental education experiences within the program, as well as look for shifts in participants' environmental attitudes and demonstration of learned ecological knowledge.

In order to develop the interview questions, a number of steps were undertaken. First, as part of the literature review, existing research that investigated topics relevant to the research study, and that utilized interviews as part of their data collection process were collected and reviewed. From these studies questions that were applicable to the proposed research study were modified (Hanna, 1988; Hillcoat & Forge, 1997). In addition, the researcher developed a number of interview questions. These included questions pertaining directly to the CCP, environmental skills development and future directions for the CCP within the context of environmental education.

In total, interviews consisted of nineteen questions. One question was designed to develop a rapport with the participant; one question was designed to measure the participants understanding of the CCP and their motivation for applying; four questions were designed to measure the participant's perception of the environment, environmental problems, personal feelings surrounding environmental issues, and personal empowerment; five questions were designed to measure the participants expectations and learning surrounding environmental knowledge, attitudes and behaviours as a result of their participation in the CCP; three questions were designed to assess the environmental skills of CCP participants; and three questions were designed to explore the participants impressions of environmental education within the context of the CCP. A copy of the interview questions is in Appendix A. In order to assist participants with potentially confusing terminology, cards with definitions of knowledge, behaviour, attitude, and belief were provided.

Interview question were pre-tested with five youth (three females and two males) of similar age to those that attend the CCP. On average, each pilot interview required approximately 65 minutes. During each pilot interview participants was asked to restate the questions in their own words so that question intent could be determined. Participants also answered each question so that the researcher could establish what sort of data was being gathered (Gall et al., 1996). Another important role that the pilot participants played was their examination of the language of each interview item. In doing so, pilot participants helped to ensure that interview items were being interpreted consistently, thus lending validity to the interview process (Gall et al., 1996).

During this time pilot participants also helped to identify confusing language and clarify proper sequence of questioning. Feedback from the pilot interviews also resulted in the interview questions being rearranged so that more complex questions were towards the latter part of the interview, as well as one question designed to create a general dialogue with the participants being added to the beginning of the interview. In addition, prompts that could be used to draw out further information were also identified and piloted.

Interviews with the research participants were conducted towards the end of the third week of each CCP program. By holding the interviews well into the CCP, this allowed for CCP participants to establish daily routines, to have had ample participation in their conservation project, and to have experienced any environmental education opportunities or activities conducted by their crew leaders.

In total, the researcher conducted 32 interviews. Each interview was approximately 75 minutes in length. For each interview, the researcher traveled to the CCP crew at its designated conservation project area. In each circumstance, the researcher would arrive late in the afternoon on the first day, spending the remainder of the evening socializing with the crew. This was done primarily to establish a rapport with the group as a whole. Throughout the course of the second day and evening, individual interviews with crewmembers would be conducted. The researcher would generally depart on the morning of the third day.

All interviews were conducted within the backcountry setting. Generally, a quiet location close to the conservation project was selected, so that participants could detail their conservation activities to the researcher during and after the interview itself. At the

onset of each interview the researcher reviewed terms addressing confidentiality, the purpose of the interview, the expected length of the interview, and the format of the interview. Each interview was audio taped. These tapes were later transcribed into written responses by the researcher. In addition, notes were taken to supplement audio transcripts and to capture non-verbal communications such as body language and environmental surroundings.

A second means of gathering qualitative data was through the use of participant journals. Over the course of their program, participants were given the opportunity to keep an environmental education journal, where their thoughts and observations on the environment during their time with the CCP were recorded.

Crew leaders were tasked with administering participant journals. Journal packages for each CCP were distributed to crew leaders at Western Spring Training. The contents of these packages, containing journals, writing instruments and instructions, were then distributed by the crew leaders to participants on day one of their CCP program. Participants were asked to record two different types of information in their journal: a weekly reflection pertaining to something related to their environmental education experiences within the CCP; and an answer to a pre-determined question of the week. In order to facilitate journaling amongst participants, each participant received suggestions for weekly suggestions along with the list of weekly questions. Reflections were designed so that participants could utilize a number of different methods, including writing, art, and poetry to record their thoughts.

Weekly questions included asking students to reflect on their connection with the environment; to list their perspective on environmental issues or problems; and to

describe their interpretation of environmental education within the CCP context. These questions were ordered in such a way so that the depth of the question built upon that of the previous week. Inspirational quotes from John Muir, Aldo Leopold and Gandhi were also included within the journals. A copy of the journal questions is included in Appendix G.

Participants were also asked to code their journal with the same code number (their birth date and month) as they had used for the pre- and post-test questionnaires. Journals were collected by the crew leaders on the last day of the program, and returned along with the post-test questionnaire to the researcher, via the CCP Seattle office.

Transcripts of the uncoded interviews and journal text were emailed to each study participant, along with a request for data verification. Participants were invited to respond with corrections, comments or questions. It was also anticipated that through the use of multiple methods of data collection, including conducting individual interviews as opposed to group interviews, validity of the case study findings would be enhanced, and that biases that might have occurred from relying completely on one data collection method would be reduced (Creswell, 1998, p. 557).

Data Analysis

As previously noted, the purpose of this study is to assess the impacts of an outdoor conservation-based program on participants' environmental knowledge and environmental attitudes. All data was analyzed for reoccurring themes across all responses.

Qualitative Data Analysis

Qualitative data collected was analyzed through the process of interpretational analysis (Borg et. al, 1996) which is the "process of examining the case study data closely in order to find constructs, themes and patterns that can be used to describe and explain the phenomenon being studied" (p.562). An alternative definition to this is that of categorical aggregation, defined by Stake (1995) as examining the data for a collection of instances, in the hopes that issue-relevant meaning will appear. A great deal of time was spent organizing data, dividing data practically, and searching for patterns. Due to the nature of using the case study process, data analysis was emergent. Thus, time was spent analyzing data, informally, while data collection was still is in progress.

Due to the varied methods of data collection, a large amount of qualitative data was generated. Thus, the first step of the qualitative data analysis process was to organize all data collected. This was done using a system of computer files. Interviews were transcribed into text and journal entries were re-recorded and stored as computer text. In regards to data collected from the participant journals, an emergent analysis process was used, where the journals were analysed at different times during other data analysis, and data that emerged from the journals was viewed as supplementary to the data obtained from the questionnaires and interviews. Furthermore, the context in which the journals were kept and subsequently interpreted was taken into account (Borg et al., 1996).

Following transcription, individual interview transcripts were read in their entirety several times so that there was an attempt to get a sense of the interview as a whole before it was divided and coded (Creswell, 1998). Memos noting key ideas or concepts

identified were taken, and a preliminary list of coding categories was developed (Bogdan and Bilken, 1992).

Next, segmenting, which involves selecting the text into meaningful segments that contain individual items of information (Borg et al., 1986) occurred. Within analysis of the interview process, this includes making each question plus the participant's response a separate segment (Borg et al., 1986). Following this format, all transcribed interviews were broken into coded segments representing complete thought statements. Once the data had been segmented, the process of 'winnowing the data' began, whereby the data was reduced into smaller, more manageable set of themes occurred (Creswell, 1998). After several sub codes that represented different themes had been developed, the interview segments were transferred from word processing format into an Excel spreadsheet. By placing each theme in a spreadsheet format, similarly coded themes could be organized together. This allowed for a tally of the total number of times one particular theme occurred. As well, by placing the data into a spreadsheet format similarly coded themes could be sorted together, thus allowing examination of text from all interviews representing a single theme. Overall, the qualitative data collected was reduced into manageable segments that could then be analyzed in light of the research study questions. Results of the data analysis are summarized and detailed in Chapter Four.

Verification of the interpretation of data collected from interviews and journals was accomplished by sending a preliminary draft of the data interpretation to the CCP participants for feedback. Any comments or revisions were incorporated into the finally study. In order to help facilitate the feedback process, each participant was asked the

following questions: Is the description of the program itself accurate? Is the description of his/her participation within the program accurate? Are the themes and constructs identified consistent with his/her experiences? Are there any themes and constructs that have been missed, or data that has misinterpreted? Did he/she have anything to add to the study? In addition, the CCP's Western Operations Director reviewed the researcher's interpretations of the CCPs draft goal statement and objectives for accuracy. No changes were recommended.

Quantitative Data Analysis

Mean pre-test and mean post-test scores for the categories of knowledge and attitudes were compared using the paired **t**-test, with a level of significance set at α=0.05. For both knowledge and attitudes, analysis using the paired **t**-test was conducted over all subjects.

CHAPTER FOUR

RESULTS

Chapter Four presents the quantitative and qualitative results of the study. Due to the substantial amount of data collected during the research study, not all of the available data are reported here. A deliberate effort was made to limit results presented to those that investigated environmental knowledge, environmental attitudes and environmental skills. The chapter begins with a review of the study purpose and research questions. Next, results that describe the sample are presented. Following this, results for each research question are detailed, with qualitative and quantitative data results described separately, and then summarized together. The chapter concludes with a summary of the results.

Purpose and Research Questions

The purpose of this research project was to assess the impact of a service-based conservation program on the environmental knowledge, environmental attitudes and environmental skills of its participants, and to assess the effectiveness of the programs' draft environmental education goal statement and objectives. It was hoped that the findings of this study would assist in the refinement of the existing draft environmental education goal and associated objectives of the CCP.

Three research questions were addressed in this study:

1. Does participation in the CCP result in an increase in participants' environmental knowledge (as it pertains to the goal and objectives of the CCP)? If so, what new knowledge is gained?
2. Does participation in the CCP result in a positive change in participants' environmental attitudes?
3. Do participants of the CCP gain new skills to work toward solving and preventing environmental problems? If so, what new skills are gained and how will these new skills prevent environmental problems?

In regards to the first research question, to determine whether participants increased their level of environmental knowledge by participating in the CCP, results reported are based on data collected and analysed from pre-test and post-test questionnaires, participant journals, and interviews. Expected, perceived and demonstrated knowledge are measured and reported in this chapter.

In regard to the second research question, to determine whether participants demonstrate a shift in positive environmental attitudes by participating in the CCP, results reported are based on data collected and analyzed from pre-test and post-test questionnaires, journals, and interviews. Both perceived and demonstrated attitude shifts were measured and are reported in this chapter. It was anticipated that participants would enter the program with moderate levels of positive environmental attitudes, and that they would demonstrate an increase in these levels after their participation. A shift in attitudes that reflected a shift from an anthropocentric to an ecocentric worldview was anticipated.

With respect to the third research question of the study, whether participants demonstrate an increase in skills learned for solving or preventing environmental problems as a result of their participation in the CCP, data were collected through post-test questionnaires and interviews. It was expected that participants would identify a positive increase in the development of skills learned towards solving current and preventing future environmental problems as a result of participating in the CCP. Amongst the learned skills anticipated were low-impact camping, environmental restoration methods, backcountry cookery, and tool use.

Results are organized around the research questions, with each results section beginning with an overview of the data collection technique used to obtain the data. Data collected from pre-test and post-test questionnaires are presented in both quantitative and qualitative form, in conjunction with qualitative data collected from journals and interviews. Data that supported the research study questions are described, with examples (i.e., quotes from interviews or journals) provided. As well, data that does not support the research questions are also described.

Participant Overview

This section of Chapter Four is designed to give a brief overview of the participants of each of the CCP's involved in this study, including their age, last grade completed, and motivation for joining the CCP.

The subjects for the research study were high-school students enrolled as volunteers in six different CCP crews. In total, fifteen males and nineteen females participated in the research study (total n=34). Twenty-nine percent of the participants

were sixteen years of age upon entering the program; 44% were seventeen years of age upon entering the program. Only one participant had previously participated in a CCP; for the remainder of the participants, this was their first experience with the CCP. Of the 34 crewmembers that participated in the research study, the majority had completed Grade 11 prior to entering the CCP.

Through both questionnaires and interview questions, participants were asked to describe their home areas. In part, this was designed to build rapport with the participants; it was also useful to see the environmental background of the participants in order to better understand their experiences within the context of a backcountry-based program.

Many of the participants that had just completed grade eleven noted that this would be their last year to participate in a program such as the CCP, as next summer they would need to secure paying jobs to pay for college tuition fees.

Participant Motivation for Entering the CCP

During the interview, crewmembers were given the opportunity to discuss their motivation for participating in the CCP. Crewmembers were motivated to participate in the CCP for many different reasons. The majority indicated that their motivation for entering the program wasn't necessarily so much to 'learn about the environment' as it was for other reasons. Several cited that their primary objective for participating in the CCP was to partake in an event that would allow them to experience camping, backpacking and outdoor living. Other reasons crewmembers cited for joining the CCP included seizing the opportunity to travel and/or get away from home for the summer, the

opportunity to do environmental-based volunteer work, to gain experience working outdoors, to meet and socialize with peers, for logistical reasons, and because the experience was exciting and/or interesting. Few participants identified the idea of actually working on a trail restoration crew to help the environment as a primary reason for joining the CCP. As one participant noted:

> The work was actually secondary...I wanted to spend my summer having fun, doing good stuff like that. I definitely thought about the work component. I just thought that was a bonus...if I was having fun and having a good time and working for a good cause then that was all the better (Mark, DNF2).

Table 1 captures a sample of the participants' motivations for participating in the CCP.

Table 1

Participant Motivations for Joining the CCP

Motivation	Participant	Sample Participant Response
Camping/Backpacking	Christy, GGNRA1	I really wanted to do more backpacking stuff. I haven't done much backpacking, just car camping
	Meredith, GGNRA2	I really wanted to go and experience backpacking, to see if it's something that I would like to do, or not.
Travel/Leave Home	Jim, GGNRA1	Well, I just wanted to get away for the summer.

Table 1 continued

Participant Motivations for Joining the CCP

Motivation	Participant	Sample Participant Response
	Mickey, NCNP	I really wanted to just see new places. That was my main reason.
Altruistic Reasons	Cath, NCNP	It's something that's important, that needs to be done.
	Laurel, GGNRA1	I wanted to see what you could go out there and do. Besides, like raising money for whatever or cleaning up the creek and stuff, I wanted to do something better. Do something real.
	Shawna, DNF1	I just wanted to do some environmental community service.
Work Experience	Kelly, DNF2	...to see if this fits the career path that I want to take...if I'm really want to do an outdoor related career.
	Christy, GGNRA2	I wanted to get more experience...because I wanted to do more environmental work in the future, if I like it.

Table 1 continued

Participant Motivations for Joining the CCP

Motivation	Participant	Sample Participant Response
Peer Interaction	Robyn, DNF3	I love spending time with other types of people in this situation, where you really bond with people, so that was definitely something.
Logistics	Ben, DNF3	The biggest thing was that it was free, because my parents weren't going to pay for it, so it was a free trip for a month.
	Lydia, GGNRA1	It took high school participants, under 18…and also that it was free.
Exciting/Interesting	Meredith, GGNRA2	Well, I really like coming out west… I thought that would be fun to do, a new experience…A teacher told me about it and said this would be interesting. So I said 'okay, I didn't have anything else to do'.
	Rachel, GGNRA1	I went through and read it and it sounded interesting and I just kind of signed up on a whim.

Table 1 continued

Participant Motivations for Joining the CCP

Motivation	Participant	Sample Participant Response
	Jesse, DNF2	I was in Biology class and the teacher said something about it...I thought it would be really fun to do... so I decided to apply...I filled out the application...and they sent me something back, 'pack you bags', yeah...they told me to come.

For many participants, there was not one singular reason for joining the CCP, but rather multiple reasons that motivated them to participate. Table 2 captures a few of these participants' perspectives.

Table 2

Participant Motivation for Joining the CCP, Citing Multiple Reasons

Participant	Participant Response
David, DNF3	First of all it was free which a lot of things weren't, and I wanted to do some sort of service work and I'd never been camping or backpacking for that long so this looked like the complete package. I think community service is important and I like the outdoors and practice what I preach, I guess.

Table 2 continued

Participant Motivation for Joining the CCP, Citing Multiple Reasons

Participant	Participant Response
Derrick, DNF3	There were several reasons. One was for just the sheer experience. Two, part of it was it looks darn good on a college resume but that wasn't my deciding factor, it's just the *chance* to do something like this, it's a life time experience, you can now say to someone this is what I spend doing this summer and they're going to be amazed because not many people go out into the wilderness and work.
Kelly, DNF2	Because I often get frustrated by...these stories about how the world is coming to an end and how the environment is so poorly treated...and you get frustrated because they never tell what you can do, and then the things that they tell you they can do, are just so minor in the end, like recycling. It's kind of overwhelming. This is kind of a small way to see what I can do. And also to see if this fits the career path that I want to take.
Levi, GGNRA1	For one thing you get to work in the woods and camp a lot and most of it is backcountry, there's lots of backcountry that you could hike out to and see animals and it sounded really fun. And you didn't have to pay a lot to go out and work because my family doesn't have a lot of money to spend.

Overall, while many reasons were given as to what motivated crewmembers to participate in the CCP, few prioritized helping and/or learning about the environment as a main reason for joining. The remainder of this chapter presents the results of data collected as organized around the research questions.

Research Question One: Environmental Knowledge

Does participation in the CCP result in an increase in participants' environmental knowledge (as it pertains to the goal and objective of the CCP)? If so, what new knowledge is gained?

It was expected that while participants would enter the program with low to moderate levels of environmental knowledge, they would demonstrate an increase in these levels through their participation in the CCP. Similarly, the SCA, as demonstrated through their draft objectives, anticipated that participants would demonstrate increased environmental knowledge of the following topics: environmental health; plant and animal identification and significance of their roles within a healthy ecosystem; core ecological concepts (i.e. succession, etc.); human impact on the environment; recycling; resource management; meteorology; conservation; the role of SCA in the environment; and stewardship. A complete list of the draft CCP environmental education objectives is listed previously in this research study. Pre-test and post-test questionnaires, interviews and participant journals, all of which contained questions that reflected the SCA objectives, were used to obtain both quantitative and qualitative knowledge data.

Environmental Knowledge Quantitative Results

Demonstrated knowledge shifts were measured through a fifteen-question inventory designed to test the knowledge-based objectives of SCA as well as general ecological concepts. In order to ensure that the pre-test and post-test questions would measure a broad range of ecological knowledge-related topics, questions applied were

developed and selected based on the following criteria: the quality of their construction and validation; their relevance to the CCP draft objectives; and as a result of the experience of the researcher as a former CCP crew leader. In regard to these last criterion, the former experience of the researcher aided in the identification of questions that were general enough to be applied to CCP crews operating across a wide range of ecosystems.

Of the thirty-four questionnaires distributed, twenty-six post-test questionnaires were returned. The pre-test questionnaires that did not have a matching post-test questionnaire returned were discarded from the statistical analysis procedures. All (n=26) of the returned post-test questionnaires were used in the statistical analysis procedures. A paired **t**-test procedure was used to compare the pre-test and the post-test scores for each of the knowledge inventories over all subjects. Over 26 cases, a paired **t**-test for knowledge resulted in a p value of $p = 0.535$. With respect to knowledge, it can be concluded that no significant differences between pre-test and post-test scores over all subjects were observed. Table 3 compares the mean and standard deviation for knowledge pre- and post-test as well as the **t**-specific and p-value for knowledge.

Table 3

Pre-test and Post-test Mean Knowledge Scores

Pre-test		Post-test		**t**	p
Mean	S	Mean	S		
9.692	2.074	9.654	2.449	-0.09	0.535

Environmental Knowledge Qualitative Results

Shifts in both perceived and demonstrated knowledge were measured using qualitative data gathered from interviews and participant journals. In addition, selected questionnaire data was also assessed qualitatively. As the interviews provided the majority of the qualitative data gathered, qualitative results are organized around the interview questions. Where applicable, journal data are noted. Questionnaire data that were analyzed qualitatively is reported on here as well.

Thirty-four crewmembers participated in semi-structured interviews that allowed for open-ended answers to pre-set questions. During the interviews crewmembers were asked to reflect on whether they felt their participation in the CCP was increasing their general environmental knowledge levels. Two knowledge-specific questions were asked. The first question was designed to explore whether participants held any expectations regarding environmental learning prior to their entry into the program. The second question was designed to assess what, if any, learning the participants felt they had gained as a result of their participation in the CCP.

In order to measure whether participants held any expectations surrounding environmental knowledge and awareness prior to their joining the CCP, they were asked to reflect on their pre-program expectations. Several of the participants indicated that at the time of their enrolment in the program they had held expectations that, through their participation in the CCP, they would increase the amount of environmental knowledge that they held to some degree. Seventeen crewmembers answered 'yes' to this question, with many exhibiting emphatic views. A selection of participant responses is summarized in Table 4.

Table 4

Pre-Program Expectations for Knowledge: Affirming Expectations Held

Participant	Participant Response
Robyn, DNF3	Definitively! Because I'd done a lot of research into the program and they said that - environmental education - definitely hoping that people would learn things about the environment that they're in, so I definitely hoped that I would have an increase in knowledge.
Eva, DNF2	That was one of the things that I really thought! That this is going to change how I live and the way I think of things.
Christy, GGNRA2	Oh yeah! Oh yeah! Definitely!

Only a few crewmembers reported that they specifically did not hold any knowledge-related expectations prior to their entering the CCP. When asked what, if any, expectations they did hold towards their participation in the CCP, a strong focus on the work component of the program emerged.

Table 5

Pre-Program Expectations for Knowledge: Expectations Not Held

Participant	Participant Response
Mickey, NCNP	No, not exactly, I pretty much thought it was just going to be a trail crew kind of thing.

Table 5 continued

Pre-Program Expectations for Knowledge: Expectations Not Held

Participant	Participant Response
Peter, NCNP	Um, actually, coming in, no, I was more, I thought that just being out here and working. I didn't think I'd learn about different flowers and trees and things like that, that, that I have been.
Journal Entry	I don't really have any expectations of learning about the environment on this trip because I know it's pretty much a work crew trip.
Journal Entry	In this program I don't have too many expectations of environmental education aside from working and living in the wilderness.

These results corresponded with the majority of participants who indicated that their motivation for entering the program wasn't necessarily so much as to 'learn about the environment' as it was to do environmental-based volunteer work, to gain experience working outdoors, to meet and socialize with peers or any of the other reasons as previously reported under the *Sample Overview* section of this chapter.

While a significant number of participants noted that prior to the program they had not held any previous expectations towards increasing their environmental knowledge through the CCP many report that after having participated in the CCP they felt this had in fact happened. Participants generally seemed to be pleased about the fact that, whether they had been expecting it or not, learning about the environment had been

part of the CCP experience. Table 6 provides a sample of the crewmembers views towards this.

Table 6

Crewmember Views on Unexpected Learning

Participant	Participant Response
Peter, NCNP	...I didn't think that I'd actually be gaining knowledge of the actual ecosystem as much as I am.
Tim, NCNP	That wasn't one of the reasons why I came, to increase my knowledge about the environment, but it's definitely really been increased significantly.
Peter, GGNRA2	I think we've gotten a general overview of everything, which is really good...I think we've learned a lot considering how long we've been here.
Meredith, GGNRA2	It kind of surprised me, all the environmental education that did do, teaching us about stuff.
Colleen, DNF3	Yes! I had no clue, like when you do a program like this it's understood, like Will and Jane <crew leaders> are just phenomenal people, they're always just pointing out little things and the people that you meet, like Bret and Darryl <agency staff>, just from talking and stuff, you know you're going to learn stuff.
Ben, DNF3	I totally didn't expect that I would be learning about the area we're in!

Many participants also made note of the importance of differentiating between school-based/formal education and environmental education within the context of the CCP. Clearly, several participants anticipated that any environmental education that was going to occur in the program would be delivered in a manner different than traditional classroom-based learning. Table 7 contains a sample of participant views surrounding this.

Table 7

Participant Views on how Environmental Education Is Delivered

Participant	Participant Response
Ben, DNF3	So I didn't expect that I would be doing that sort of stuff <learning environmental education>…I expected that would be school stuff and I totally didn't expect any kind of environmental education like that.
Christy, GGNRA2	I guess I don't really want them to make it into a big class, I want it to be more relaxing and I don't want them to be like 'This is this, and this is this, etc." but more like if it comes up kind of a thing, then kind of pick it up.
David, DNF3	There's stuff like what I took during the school year like learning about environmental science, and learning about other stuff and I think that this is another equally if not more important way of coming out and dealing with the stuff, learning how streams work, ecology, biology, a little bit of sociology.

Table 7 continued

Participant Views on how Environmental Education Is Delivered

Participant	Participant Response
Ben, DNF3	...we see the bear prints and we see the elk, where they have run around and trampled the ground. So I didn't expect that I would be doing that sort of stuff I expected that would be school stuff and I totally didn't expect any kind of environmental education like that.
Christy, GGNRA2	...it's not like I'm cramming it all in my head, like school, like I read a book and suck it up, it's more like 'oh yeah, I guess I did learn that'. I guess I did pick up a little bit about...native plants, it's just that I never spit it out all at one time, all the different information. If you see it every day and you hear about it kind of helps makes the connections, really more helpful than looking at it in books.
Camilla, NCNP	I always think of teaching as sitting down in the classroom, so like this is the whole hands-on learning, less of the learning things, more of the acquiring knowledge I didn't have.

Several participants also indicated that, while they weren't expecting a formal curriculum that would specifically teach environmental education lessons, they felt that just by being in the program and exposed to the out-of-doors, they would increase their level of environmental knowledge. As Meredith, from the GGNRA2 crew noted, "every time you go out into the wilderness you learn something about the environment". By just

by being there and interacting with their environment, many crewmembers expected their levels of environmental knowledge to increase. "Yes...about the whole learning thing, I think that just by being in the environment I don't think there's any way you couldn't pick up things" (Christy, GGNRA2).

During the interviews, those participants that did report initial expectations pertaining to environmental learning were probed deeper in an attempt to discover what these initial expectations surrounding environmental knowledge might be. Three specific themes emerged: camping and wilderness living; stewardship and conservation; and basic ecological concepts. Each is described below.

Camping and Wilderness Living. Many participants spoke of the link between low-impact (commonly referred to as 'Leave No Trace') camping and environmental education. Several crewmembers considered the teachings of cooking, living, and working in the wilderness as an important component of good environmental education; that to protect and conserve the environment first one must know how to carefully live in it. As one participant noted, while expressing her desire to learn more about low-impact camping "I know that I've gone out and done some stuff that I probably shouldn't have but might not do it in the future." She concluded that if she learnt more about the Leave No Trace ideology, she would be able to be a better environmental steward in the future; hence this was part of her initial motivation to sign up for a CCP crew. Table 8 provides a sample of participants' views surrounding camping and wilderness living.

Table 8

Participant Expectations: Camping and Wilderness Living

Participant	Participant Response
Jesse, DNF2	Hiking techniques, yes, I did expect to learn that. Hanging food, spiking camp, how to effectively put up a tent, I had expectations about that.
Abby, DNF1	On a basic level, I expected a lot of Leave No Trace ideology.
Camilla, NCNP	You know what, I did...it's a completely different environment than I've been in my life so it's like I would learn how people would live out here and how people can do it.
Kelly, DNF2	I expect, definitely like, the Leave No Trace thing. Kind of working and kind of educating yourself about the environment without affecting it, so that future generations can come to this camp and appreciate and enjoy it

Stewardship and Conservation. Another theme that emerged when discussing pre-program expectations was stewardship and conservation. Crewmembers that expressed this expectation did not make a clear distinction between general stewardship and conservation, and conservation as it related to trail work. For many participants, trail maintenance and restoration were seen as acts of conservation and stewardship. Table 9 provides a sample of participants' views surrounding the theme of stewardship and conservation.

Table 9

Participant Expectations: Stewardship and Conservation

Participant	Participant Response
Camilla, NCNP	I think I also expected and I still kind of do, how exactly to conserve the environment, how to like treat it differently and prevent it from disappearing.
Ben, DNF3	I expected environmental knowledge in the sense of making trails because that would help minimize the impact so that would help the environment, definitely in that case.
Abby, DNF1	…that living outside and being in the environment with, …you know, with ten or less people who also cared that much to give up their summers to be here also, we would maybe learn something about the environment.
Rachel, GGNRA1	I expected to learn conservation for how to conserve a trail or how to make it better.
Journal Entry	I expect to learn about how we can work towards a better earth and/or about better way to tread on the earth (or treat it).

Basic Ecological Concepts. The third theme that arose when knowledge expectations were discussed was basic ecological concepts. Several participants spoke about their pre-program anticipations that they would learn about important ecological concepts such as food chains and food webs, about plant and animal identification, and about climate and weather patterns. However, few participants were able to describe in

detail these expectations. Rather, most participants noted that while they held 'general' expectations surrounding ecological topics, they were unsure as to what specifically they expected to learn. Table 10 provides a sample of participants' views surrounding ecological concepts.

Table 10

Participant Expectations: Ecological Concepts.

Participant	Participant Response
Eric, DNF1	...About this ecosystem we're in and some of the problems and some of the solutions, some of the things that you can do to lessen the impact on the environment.
Meredith, GGNRA2	I thought that by coming out here the Crew Leaders would educate us about what was going on and how this environment functions here, in Tennessee Valley. Just like how the animals are living, the coyotes here and the deer and how the plants that grow here, which plants grow here, which ones don't and why.
Shawna, DNF1	I did. Not a lot. I didn't expect to have this new amazing idea about how the environment works but I think about general areas. The different types of trees, the weather, the different animals. About what we are doing effects the environment, like our projects.
Journal Entry	I do expect to learn about the environment during my time in SCA. I expect to learn about the complex ecosystem in the area that functions so well and continuously.

Overall, while the majority of participants hoped that their experiences with the CCP would include some degree of environmental education activities and learning, crewmembers were vague as to specifically what they hoped to learn. As one participant stated "I didn't think of it as learning about the environment so much as learning how to help the environment" (Laurel, GGNRA1). When probed many crewmembers were unable to provide detailed articulations as to what exactly what they thought they would be learning. "It's not that I didn't want to learn about the environment, I didn't really know quite what to expect" (Mickey, NCNP). Most participants expressed expectations that they would learn about general basic ecological concepts while participating in the CCP.

In addition to the interview and journal data, one item on the pre-test questionnaire designed to measure participant's expectations for knowledge was assessed qualitatively. Participants were asked to rate the following question, using a Likert scale that ranged from Strongly Disagree to Strongly Agree: "I expected that an important part of this program will be improving my knowledge of ecology". Thirty-two percent of crewmembers responded that they 'Strongly Agree' that improving their ecological knowledge would be important part of the program; 53% responded that they "Agree". From these results it can be inferred that the majority of CCP participants (85%) entering into the program expected that some level of environmental learning would occur.

Environmental Knowledge Results – During and Post Program

The second interview question was designed to capture participants' impressions of what they felt they had been learning during the CCP so that these could be compared

to the CCP draft objectives. The purpose behind this question was to examine which, if any, CCP objectives were being met when viewed through the participants' perspective. Where applicable, journal and questionnaire data results are also reported here.

When asked what they felt they were learning during the CCP, participants initially provided a multitude of responses. Upon analysis, seven themes emerged from the data: (1) environmental stewardship; (2) Leave No Trace/low impact camping; (3) forest management; (4) flora and fauna identification and knowledge; (5) curbing consumption and the three 'R's'; (6) general ecological concepts; and (7) the role of resource agencies. Each theme is described separately.

Environmental Stewardship. When asked what they felt they had learned during the CCP, a strong theme that emerged from the data was that of 'care for the earth'. Many crewmembers reported an increased awareness and understanding of the general importance of caring for and working towards conserving the environment. As one participant noted, "I've gained respect for the people who do that and just how much better the environment could be with just a little bit of work towards it" (Mark, DNF2). Other participants express surprise over their attainment of newfound conservation knowledge. Table 11 captures a selection of participant responses relating to environmental stewardship.

Table 11

Participant Responses – Environmental Stewardship

Participant	Participant Response
Journal Entry	My participation increased my awareness of my impact on Earth and made me want to be more careful to have a positive impact. That's the most important thing that I've learned.
Spencer, DNF2	I'm actually learning more than I thought I would! Mainly like we have this thing called teaching night, where everyone teaches something and mainly we talk about SSC and activism and how we can try to protect and conserve national forests and I didn't really think that I would be learning anything like that.
Journal Entry	The most important thing I learned about the environment during this program is to preserve the environment.

Leave No Trace/Low Impact Camping. A second theme to emerge from the qualitative data was the importance crewmembers placed on learning about low impact camping. The majority of crewmembers involved in the research identified low impact/Leave No Trace camping as an area of knowledge that had increased during the CCP. It is important to note is that many participants didn't just identify how to camp in the environment, which would demonstrate an increase in environmental skills development, but rather made they connection between why low impact camping was important in terms of maintaining environmental health and integrity. This demonstrated that participants might have made a connection between identifying an action for the

environment and the ecological principles that underlay that action. Table 12 provides a sample of participant responses.

Table 12

Participant Responses – No Trace/Low Impact Camping

Participant	Participant Response
Eva, DNF2	What I've got most from this program is how I work with the environment and how I live in the environment and one thing that really sticks out is, hiking trails and the whole leave no trace thing.
Meredith, GGNRA2	He <guest speaker> talked about the campfires, what you shouldn't do that, which I guess because you leave all the charcoal, the coal there and it never really goes away, it just stays there and you don't really want to do that, he was talking about ways to prevent that from happening…
Journal Entry	I learned about Leave No Trace and I think that's one of the most important things I've learned because I didn't realize how fragile the ecosystem was…
Abby, DNF1	To have like a single path, to do everything two hundred feet away from water, fire safety and everything in general, using durable surfaces.
Camilla, NCNP	I think it would have to be that whole thing, that washing the hands in the river, how the littlest things will affect everything that's out there….even though there's a strong current the smallest thing could affect a deer that could be drinking out of the water a 100

Table 12 continued

Participant Responses – No Trace/Low Impact Camping

Participant	Participant Response
	yards down...so one of the first rules of being here is making it look like you were never here at all...keeping things exactly as they are and trying to affect things as little as possible. We clean up after ourselves really well.
Rachel, GGNRA1	I learned about the right way to keep our food and if we don't clean up after ourselves and put everything away...it will be gone in the morning. And that's hard on the animals because they'll come back hoping to get more, then they won't learn to get it themselves and they'll depend on us.

Forest Management. A third theme that emerged during the interviews and journal analysis was that of humankind's role in forest management. Within this theme, a number of participants were able to demonstrate the connection between human interactions with forest landscapes and forest health. Many crewmembers made the connection between their immediate environment and the impacts of forest harvesting techniques. Considerable concern was voiced over the topics of clearcutting and industrial forestry, and many participants cited the need to consider alternatives such as ecoforestry or sustainable harvesting methods. Members from two different crews (NCNP and DNF1) commented on how crew leaders had held guided discussions with the crewmembers, designed to further explore these alternative forestry concepts.

Crewmembers appeared to respond favourably to these talks. Table 13 summarizes a sample of participant responses regarding forest management practices.

Table 13

Participant Responses – Forest Management

Participant	Participant Response
Kelly, DNF2	Clear cutting! When we were driving in, we saw a lot of mountains that were clear-cut and how that is a problem because of erosion and stuff. It clogs the streams with mud and stuff and affects the fish population and the whole cycle.
Lisa, NCNP	I had no idea that like in whatever National Forest could be cut like that, I mean it's not technically clearcut or anything like that but I thought that it was a little more protected than that I guess.
Jesse, DNF2	We had debates about clear cutting, selective cutting, some people are for it and some people are against it...
Laurel, GGNRA1	...it seems like you don't have to go in here and do clearcuts and get mud flows and destroy things, and if you just cut down, what's it called, sustainable management, ecoforestry, selective logging, it wouldn't be so bad....because fragmentation of habitat doesn't really need to happen and destruction of habitat in general and endangered and rare things, microhabitats and then it just causes problems the whole way, it causes flooding and mud slides.
Ben, DNF3	I've learned a little bit more about forest management, by being out here and seeing how it works.

The year of 2002 also saw a significant number of large, uncontrolled forest fires burning throughout the western United States. Many of the participants in the study were operating in areas close to one of these fires. Several crews reported experiencing dense smoke and observing aerial firefighting operations. When interviewed, quite a few participants remarked on the impact of the fires on their crew. Their comments indicated that the importance of the fires on forest health and the role of human intervention in the fires had been areas of interest discussed within their crews. Many participants also described the relationship that the fires played in the health of the forest ecosystems surrounding them. In addition, a number of participants illustrated the impacts that the fires would have on human's interest in using and learning from wilderness places. Table 14 captures just a few of their comments.

Table 14

Participant Responses – The Relationship Between Forests and Fire

Participant	Participant Response
Derrick, DNF3	From the fires… one thing I realized about fire that I didn't know before… I've definitely learned about the way these forest grows, the role of the fire cycle…the fire would burn a certain dead layer and old trees so that nitrogen could be replaced in the soil by new plants <that> could come up and grow before the other trees could grow and thereby adding nitrogen to the soil...these small plants around here, they grow in the open ground and then the small plants move in and add nitrogen and then bushes…

Table 14 continued

Participant Responses – The Relationship Between Forests and Fire

Participant	Participant Response
Meredith, GGNRA2	I think that's a pretty big concern…just the burning down of trees and just places like this. I wouldn't want to see this place burnt down. That would be a big problem. A lot of animals losing their homes, and places for people to go and enjoy, like this, where they can just come and walk. People are losing the ability to do that. Places where people can learn about the environment and they can't do that right now because there are fires everywhere.
Ben, DNF3	I learned…when you stop the forest fires you get forests that are choked practically and then you get more and more dead matter and then suddenly the whole thing goes up in flames and that's not what you want. You want smaller fires, forests like this, where a couple of dead tress are going to burn and it's going to make room for other trees and stuff

Flora and Fauna Identification and Knowledge. When asked to describe what they had learned during the CCP, a fourth theme that emerged was that of flora and fauna identification and knowledge. Within this area, participant responses ranged from their learning to name or identify local plants or animals to detailed responses about the role of a particular species within the greater ecosystem. Many crewmembers were able to give detailed descriptions of the importance that these plants and/or animals held in relation to the health of the surrounding ecosystem, and vice versa. As one participant noted in their journal:

> The area we are working in, the whole of Phleger Estates, is part of an important watershed for the steelhead trout...one of the most important and most vulnerable aspects of a park is its habitat value to wildlife...our trail work is a small part of the solution for these fish, which use the streams for spawning grounds, if they are kept suitable...improving the trails drainage will keep excess sediment from clogging the gravel of the streams that the fish need to lay their eggs on.

Several participants also commented that they felt it simply wasn't important to learn the names of different plants or animals if their connection to the rest of the ecosystem wasn't established. Similarly, other participants questioned the importance of learning about the species around them, when their immediate environment was so different from their home environments. "When we are walking along, they'll <crew leaders> point out a plant and it'll be 'lupine'...but this stuff is just so specific to this area..." (Jesse, DNF2). The transferability of what they were learning at their CCP site to their home environment was raised by many participants. Table 15 captures a selection of crewmember comments on learning about flora and fauna identification and knowledge.

Table 15

Participant Responses – Flora and Fauna Identification and Knowledge

Participant	Participant Response
Sharada, DNF1	...when it comes to names I don't really know what anything is called here besides ants, lupine and chipmunks...

Table 15 continued

Participant Responses – Flora and Fauna Identification and Knowledge

Participant	Participant Response
Eric, DNF1	We've learned some of the stuff about the plants and animals. We tried to identify some of the trees around here. Like each of the tree types. We were like "wait a minute this one's not the same"...like pine and fir...other things like that. A few birds that we identified. And flowers.
Emily, DNF1	The botany thing was cool. We had a botanist come and we walked around and she told us about all the flowers and stuff...about the wild flowers.
Kaity, DNF2	Every time we have a trivia thing, for the wildflowers and tree, she'll <crew leader> pull off a pine needle and ask us, what kind of tree is this? We can identify trees now and pick out flowers and go pick out shooting stars...so she has showed us a lot. That is cool.
Sharada, DNF1	I'll go back to the city and people will be like "What are the trees you grow with"? And I will be like "Pine trees. I don't know but there were lots of them though". That really doesn't impress me at all. I kind of let go of people who are articulate and know the names of everything because it really doesn't make a difference if you know the names of everything.

Table 15 continued

Participant Responses – Flora and Fauna Identification and Knowledge

Participant	Participant Response
Eva, DNF2	Most of what I've learned is that I like plant identification and it's nice being in a different area, learning about plants. I think that what I've learned most is that it is so different from where I live.
Christy, GGNRA2	And the owls are around here a lot...Great Horned Owls! And I was like, 'oh mi god, is that the kind of stuff we're going to be seeing around here!" And...I'm like 'you've got bobcats!'. I haven't been in a place where it's so secluded, so into nature that there's animals like that before.
Jesse, DNF2	I've learned some <about> the plants, "It will be like this looks edible, but it looks like that one but it could be poisonous"...there are some out here that I asked if they are edible or poisonous and they said they're poisonous, you can't eat them, when you could. So there probably is a difference. Most of the stuff I've learned will only help me out here and I will probably forgetting all of it, as I won't probably be out west until next summer.

Curbing Consumption and the 'Three R's'. During the data analysis, another learned knowledge theme that emerged was reducing personal consumption and the idea of reducing, reusing and recycling. Several crewmembers reported that, for the first time in their lives, they were participating in recycling and composting activities while in the

CCP. In many cases, despite being deep within the backcountry, several crews had developed systems that included composting and sorting recyclable materials. A great emphasis was placed on the role of 'reducing and reusing'. As one participant noted, "carrying everything on your back when you leave, you really realize how much you use....then when we leave, we have to pack out all our trash. If I re-use more, then I'll have less to carry out" (Kelly, DNF2). A sample of participant feedback surrounding this theme is captured in Table 16.

Table 16

Participant Responses – Curbing Consumption and the 'Three R's'

Participant	Participant Response
Eva, DNF2	And one thing I've really been conscious of is that whole 'reduce, reuse, and recycle' thing. Like the whole reducing and reusing.
Laurel, GGNRA1	They <crew leaders> were talking about consumption and how to curb your consumption and using less stuff. And also just the way we have a compost bag and not wasting food...
Kaity, DNF2	Mike has a book...I never saw life that way. And I agree with almost everything that is in it and he showed me that. There is a lot of knowledge to open your eyes to...it is called *Voluntary Simplicity* and a lot of my ideas are in it. I was like "Oh! Somebody agrees".

A significant number of crewmembers spoke of the relevancy and transferability of this learning to their every-day lives, noting that over everything else learned, these may the most easy for them to implement after the CCP.

General Ecological Concepts. A sixth thematic area to arise from the data was ecological concepts. Through learning ecological concepts crewmembers can achieve an awareness of the environment and develop a foundation of facts and models that upon which decision making processes are based (Hungerford et al., 1980). Ecological concepts include individuals and populations; interaction and interdependence; environmental influences and limiting factors; energy flow and materials cycling; community and ecosystem concepts; homeostasis; and succession.

While the majority of participants did not identify specific ecological concepts as part of their environmental learning from the CCP, a small number of crewmembers did discuss, often in detail, experiences through games, activities and group discussions that had taught them ecological concepts related to their immediate area. Decomposition, interaction and interdependence; energy flow, food chains and food webs; and succession were all mentioned by crewmembers during the interviews and in their journals. In particular, many participants noted the importance of ecological cycles and ecosystem connections. As one participant noted in her journal:

> I learned that with one link missing from the ecosystem, every step of the cycles must be altered....for example, logging the forests destroys the habitat of sub layers in the forest...such a simple act plays such a large part in life and really illustrates how all life connects to everything, the importance to preserve each part.

Table 17 offers a sample of crewmember comments in the area of ecological knowledge.

Table 17

Participant Responses – General Ecological Concepts

Participant	Participant Response
Eva, DNF2	I think I've kind of got a better understanding how the environment functions.
Derrick, DNF3	I learned small plants (like huckleberry) fix nitrogen, while the spruce don't fix nitrogen, they only have microrhyzal fungi that take out of the soil which is why the small plants are so important an important part of the ecosystem because they replenish the soil.
David, DNF3	One thing I learned was how <in> this really dry climate, how things decompose really slowly and how that changes what kind of plants can grow here and things like that.
Journal Entry	I learned a lot about my environment when the botanist came and told us about all of the plants in the area. That was extremely interesting!
Journal Entry	Today we played...Bears, Salmon and Mosquitoes, where the bear eats the salmon, the salmon eat the mosquito and the mosquito kills the bear. The circle of life!

The Role of Resource Agencies: The role of governmental and non-governmental resource agencies was a seventh theme that emerged from the qualitative data. When asked to reflect on what environmental learning they had received, several crewmembers

identified learning about environmental careers and the importance of resource agencies in caring for the environment as important objectives of environmental education that they had been exposed to.

Table 18

Participant Responses – The Role of Resource Agencies

Participant	Participant Response
Kelly, DNF2	I also did talk to some of the Forest and Park service people and learned about the career paths and what they were all about. Firefighting and law enforcement. I like learning about the career paths.
Peter, GGNRA2	We had a guy, a guest speaker, named Robert…he's a Ranger, a park-like police ranger so he gets people for biking on trails or having dogs off their leashes.
Kaity, DNF2	… we talked to several different rangers just to see what they are doing. We talked to a firefighter. We talked to a dispatcher. We talked to a law enforcement back country member. We talked to Brett about what we he did, he works at the agency. We talked to Phil and what he did. We've met a lot of people and what they do, their part in it.
Spencer, DNF2	…the ranger, she talked about what she does, she's the Wilderness Patrol Ranger, and she has like 2,000 acres that she covers and she

	maintains things out there, and occasionally makes arrests or tells people who are camped in the wrong spot. We talked to Bret and Judith and the other park rangers around and they gave us some background information on issues.
Peter, GGNRA2	We are keeping track of the coyote howls…that we hear, in a journal for Erin, who's with the United States Geological Survey, and she's out here studying the coyotes. Apparently they're just now returning to the area. They were previously wiped out so it's only been within the past five or six years that they've been coming back down to here.

Post-test Results on Perceived Knowledge Shifts

In addition to the data collected from the participant interviews, two questions on the post-test questionnaires were designed to collect perceived knowledge data. Data collected from each question were analyzed qualitatively and are discussed as follows.

The first question asked participants to rate their perceived knowledge change as a result of their participation in the CCP. Twenty statements were presented, and each statement was selected based on its representation of a CCP draft objectives. Overall, most crewmembers responded favourably to the majority of the inventory items, selecting either 'Strongly Agree' or 'Agree'. For example, when asked if they felt their knowledge of human impacts on the earth had increased during their participation in the CCP, 50% selected 'Strongly Agree' and 34% selected 'Agree'. Similarly, when asked if their knowledge of conservation had increased, 38% responded 'Strongly Agree', and 42%

'Agree'. Other inventory items that also received scoring that reflected a positive shift in knowledge levels included having general awareness of the natural environment and personal ability to help the earth.

In other knowledge inventory items, crewmember responses reflected a less than favorable shift in perceived environmental knowledge acquisition. The areas of increased knowledge of past and present land use, government agencies and environmental law issues all received lower scores. When rating if their knowledge of law issues had increased during the CCP, 57% of crewmembers replied that they either disagreed or were neutral. Similarly, 46% of participants stated they 'disagreed', 'strongly disagreed' or were 'neutral' when asked if their knowledge of government agencies increased during the CCP.

A second item on the post-test questionnaire asked participants to consider whether participating in the CCP had made them significantly more aware of the environment. Out of twenty-four participants' responses, 58% selected 'yes'; 25% selected 'no'; and 17% replied they were 'unsure'. Participants were asked to clarify further their answers through open-ended statements. Table 19 provides a summary of participant comments, grouped by their response.

Table 19

Participant Responses Regarding Changes in Environmental Awareness

Response	Participant Comment
Yes	We were shown how we impact and can help 'not' impact the area we work and camp in!!

	I now know what is really going on and what I can do to help.
	By living outside for five weeks I am more aware of the world around me. Mainly because I was in the environment for so long and that made me notice more things about it.
	I didn't realize that even the simplest things were effecting the environment.
	Working in the environment has increased my knowledge of issues regarding the environment. I have learned to treat my home well.
	Being in the outdoors, one becomes more in tune with nature and the environment.
	Spending time outside, thinking about nature, makes it seem closer and more personal and more important to tread it gently.
	The issues surrounding its conservation were discussed and since I have learned about it and have the knowledge I feel more aware of the environment that I came to protect.
No	I had a fair amount of awareness in the environment previous to the program.
	I was already aware of the environment.

Table 19 continued

Participant Responses Regarding Changes in Environmental Awareness

Response	Participant Comment
	I really just don't feel much more aware of the environment than I was before.
Maybe	Not significantly but somewhat.
	I guess it's hard to tell until I get back home.

In reviewing the data, crewmembers that selected 'yes' generally tended to provide additional clarifying comments, whereas the majority of those participants that selected 'no' and 'maybe/unsure' declined to expand on their answer.

The Role of Crew Leaders in Teaching Environmental Education

In addition to the seven themes that emerged from the data surrounding 'what' types of environmental education knowledge was transmitted during the CCP, one additional theme that also surfaced was 'how' environmental education was taught within the CCP. A significant number of crewmembers spoke of the important role that crew leaders held in teaching environmental education. Over sixty percent of participants' interviews remarked on the important role that crew leaders played in teaching environmental education. The majority of these respondents noted that they appreciated how, more often than not, environmental education lessons were transmitted in an informal manner, and that lessons were different than those taught at school. As one participant noted, "I don't know if I'd like them sitting us down and talking about school-

related stuff during the summer" (Rachel, GGNRA1). Games, guest speakers, field trips and hikes were all cited as favourable ways for crew leaders to teach about the environment. Table 20 summarizes participant comments regarding crew leader instruction in environmental education.

Table 20

The Role of Crew Leaders in Teaching Environmental Education

Participant	Participant Response
Abby, DNF1	Yvonne <crew leader> being here and telling us about like how, just her physical being here and giving up her time to work for basically no money is showing me what service to the earth is.
Christy, GGNRA2	I think Chris and Catja are good teachers. They have a lot of information, like they told us all about the plants and stuff like that but also what they do and their experiences so far.
Meredith, GGNRA2	It kind of surprised me, all the environmental education that they <crew leaders> do, teaching us about stuff...how much knowledge that they have...I guess I assumed that they would be educated about this stuff, but they kind of surprised me about the amount of knowledge that they did have.
Journal Entry	I also have learned basic identification of trees, plants, and bugs thanks to Sarah! I now can tell people, guide people, show people knowledge I have gained!!

Table 20 continued

The Role of Crew Leaders in Teaching Environmental Education

Participant	Participant Response
Tim, NCNP	Both Erich and Emily have wide knowledge of the flowers and flora and fauna in general and they're great educators, they help out a lot.
Christy, GGNRA2	I think we learn a lot more because we have these resources like Catja, who can explain it so it was like if we have these great resources how could you not pick anything up.
Camilla, NCNP	I guess the leaders don't make it like, 'that is why we're here, to teach you about it, you're going to learn about it, we're going to teach about it by doing it.'

Knowledge Results Summary

To summarize, shifts in both perceived and demonstrated knowledge were measured. Quantitative data gathered reflects that no significant difference demonstrated between knowledge scores post-test and knowledge pre-test over or between crews. Data gathered through qualitative methods indicates while a significant number of participants held pre-program expectations surrounding increasing their environmental knowledge levels, few participants were able to identify what they expected to learn. From the data generated by participants who were able to articulate their pre-program expectations

surrounding learning about the environment, three themes emerged: camping and wilderness living; stewardship and conservation; and basic ecological concepts.

When asked to report what they considered they were learning within the context of increasing their environmental knowledge, crewmembers identified a number of topics, which can be captured within seven themes: (1) environmental stewardship; (2) Leave No Trace/low impact camping; (3) forest management; (4) flora and fauna identification and knowledge; (5) curbing consumption and the three 'R's'; (6) general ecological concepts; and (7) the role of resource agencies. In regards to the data gathered that resulted in the development of these seven themes, it is important to note that participants may have learned a lot more about the environment than what emerged during the data collection procedures, and that the data collected may reflect their ideas about only what they considered items important enough to report.

Several participants discussed the importance of having environmental education taught in a manner different than traditional school-based instruction. As well, many crewmembers commented on the important role that crew leaders played in teaching environmental education within the context of the CCP.

Research Question Two: Environmental Attitudes

Does participation in the CCP result in a positive change in participant's environmental attitudes?

It was expected that participants would demonstrate a positive shift in environmental attitudes through their participation in the CCP. Pre-test and post-test questionnaires, interviews and participant journals, all of which contained questions that

reflected the SCA objectives, were used to obtain both quantitative and qualitative data that measured environmental attitudes.

For the purpose of this study, attitudes were defined as having three components: affective (individual or emotional feelings about the attitude object); cognitive (the belief or knowledge about the attitude object); and behavioural/conative (the individual's predisposition to act towards the attitudinal object in a particular way). Attitudes can serve as a viewpoint towards a particular object, and thus may predispose an individual's actions (Gall, Borg & Gall, 1996).

Environmental Attitudes Quantitative Results

Attitude shifts were measured through a twenty-item inventory comprised of statements that measure the respondents' attitudes towards the environment. Nine questions were worded negatively and thus reverse coded to reduce the possibility of patterned response.

Twenty-six post-test questionnaires were returned. The remaining pre-test questionnaires that did not have a matching post-test questionnaire returned were discarded from the statistical analysis procedures. All (n=26) of the returned post-test questionnaires were used in the statistical analysis procedures. A paired **t**-test procedure was used to compare the pre-test and the post-test scores for each of the attitude inventories over all subjects. Over 26 cases, a paired **t**-test for knowledge resulted in a p value of $p = 0.917$. With respect to attitudes, it can be concluded that no significant differences between pre-test scores and post-test scores over all subjects were

demonstrated. Table 21 compares the mean and standard deviation for attitudes pre- and post-test as well as the t-specific and p-value for attitude.

Table 21

Pre-test and Post-test Mean Attitude Scores

Pre-test		Post-test		t	p
Mean	S	Mean	S		
0.801	0.061	0.780	0.096	-1.43	0.917

Environmental Attitudes Qualitative Results

Shifts in attitudes were also measured using qualitative data gathered from interviews and participant journals. In addition, selected questionnaire data were also assessed qualitatively.

During the interview one attitude-specific question asked: "Do you think your attitude towards the environment has changed as a result of your participation in this program?" The purpose behind this question was to examine if participants felt their attitudes towards the environment had been positively influenced through their participation the CCP, and if so, what this influence was.

In order to assist crewmembers in answering the question, participants were provided with the definition for attitude being used for this research study. Prompts were also used to probe deeper into crewmembers responses. Thirty-four crewmembers provided responses to this question; their responses are reported as follows.

During the interviews nearly forty percent of the crewmembers reported that their attitude towards the environment had 'definitely' been positively affected by the CCP. In

an attempt to gain a deeper understanding of reported attitude shifts, these participants were asked to give examples of how they felt their attitudes had changed. A multitude of responses were provided, and upon further analysis, three themes emerged: (1) increased awareness and appreciation; (2) increased empowerment; and (3) motivation to take action. Each theme is described as follows.

Increased Awareness and Appreciation. When asked in what ways they felt their attitudes towards the environment had favourably shifted during the CCP, many crewmembers reported having a greater sense of appreciation for the natural environment. Similarly, feelings of increased respect and a greater awareness of the importance of maintaining a healthy environment were highlighted. Many participants also commented on how the CCP had reinforced pre-existing feelings of awareness and appreciation. As one participant noted:

> I had pretty strong feelings about appreciating the environment, like things I thought I should see happen when I came in here...since I came here I have become stronger in my attitude toward the environment...I like the environment more now...I defend <issues> a lot harder now than I would have. Jesse, DNF2

Table 22 contains a sample of participant responses surrounding the theme of increased awareness and appreciation.

Table 22

Increased Awareness and Appreciation

Participant	Participant Response
Kaity, DNF2	It is an appreciation for what you have, what is there and what is untouched.

Table 22 continued

Increased Awareness and Appreciation

Participant	Participant Response
Eva, DNF2	As for my attitude towards how I feel about the environment, I feel that I understand more the importance of having everything natural. I never really thought about it before. I feel like the environment is inspiring to me, kind of like a peaceful place.
Sharada, DNF1	Definitely. I cared a little bit before I went in, but it is hard to care about something when you don't even know about it...this is good because you go out here and you bond with the land. You've walked up this trail like fifty million times...you know where each rock is...I am going to be dreaming of this trail when I leave. You feel connected to it because you've worked so hard on it.
Mark, DNF2	I've gained more respect for the environment by coming out here. A small example is that a year ago, I don't think I would have cared too much about cutting down this little tree, as opposed to not cutting it down. I care more now. I've seen how much of an affect one little tree has on people and it could be some birds home in 5 or 6 years and I think it's about the future of our environment.

Increased Empowerment. A second theme that emerged from the interview data was that of personal empowerment. In discussing their attitudes, many crewmembers

spoke of experiencing increased feelings of empowerment towards working on environmental problems, and how these feelings of empowerment were a direct result of a positive shift in environmental attitudes. Many crewmembers also commented on how their participation in the CCP made them feel as though they could make a difference at home or in the larger community. Table 23 summarizes a sample of crewmember responses.

Table 23

Increased Empowerment

Participant	Participant Response
Kelly, DNF2	Before I felt frustrated for the environment because I thought there was nothing I could do...now I feel like I can do something, even just doing the little things. Like coming here kind of taught me that you can do little things to kind of make a big change in your town or with a group.
Robyn, DNF3	When I go home I'll have stronger feelings about the protection of areas like this because we've spent time in it and learned how beautiful there were. And I know what it's like, like I can see what affects people have on them <beautiful areas>, because I've been here.
Rachel, GGNRA2	Definitely. Before I came here...I thought that what I was doing for the environment was enough, but Susan and Erich have taught us that there's more that we can do, like conserving water and stuff like that, like low-impact camping.

Motivation to Take Action. A third theme that emerged during discussing the impacts of the CCP on their attitudes towards the environment was motivation to take action. In addition to remarking on increased feelings of empowerment, many crewmembers also spoke of how they felt a greater sense of motivation to work on preventing or solving environmental issues after the CCP. Several crewmembers commented on the link between acquiring environmental knowledge and the formation of positive attitudes:

> I know what to do now better than before, so it's influence my behaviour towards the environment because I know what affect it has...on this program I've been told not just what to do, but why to do it and I think that's influenced my attitude because I understand better (Robyn, DNF3).

Many crewmembers also noted specific ways in which they saw themselves taking action to help the environment. Some saw themselves practicing personal actions at home, such as having shorter showers, saving electricity or composting. Others saw themselves joining organizations such as Sierra Youth Coalition, working on environmental campaigns, or starting environmental clubs within their schools. And yet others identified that they were motivated to participate in service work activities, practice low impact camping skills, and possible explore career fields related to environmental conservation and/or restoration. Examples of these actions are contained in Table 24.

Table 24

Motivation to Take Action

Participant	Participant Response
Kaity, DNF1	I am not just going to throw out the food that I didn't eat on my dinner plate or take a shower everyday…just be aware that I can second hand shop …that you don't need to go out and buy everything new…it has it has made me more aware of my life and the environment that I live in.
Camilla, NCNP	I'm going to try more, to conserve things, using less, like gas in the car and walking more places and just like recycling more… I've kind of stop doing that stuff because I don't think about it, 'cause that's just the kind of environment that I live in, it's kind of like, oh just throw it away, it'll get taken care of by somebody else, you know...it'll now be more my responsibility than I thought it was. It's 'everybody's' responsibility to take care of what's out here, and not just somebody else's.
Lydia, GGNRA1	Pay a little more attention when I take a shower, not lingering, take quicker showers to conserve water. We always talk about how we use water up!
Christy, GGRNA2	… push recycling, help out a little more than I normally do, like go to clean ups at volunteer places. Oh yeah, and I'll shower less. I'll cut back, and I'll save water and also electricity.

Table 24 continued

Motivation to Take Action

Participant	Participant Response
Kelly, DNF2	I'll try and get more involved I think, with like environmental club that try and help restore and protect the environment. Like the Sierra Club, maybe I'll join the student coalition; maybe I'll join the group in my high school, the Outings Club.
Jim, GGNRA1	Definitely. I won't waste any food like I used to. Now, when I come into a park I will look at the trails and I won't look at them the same and when I get home I'll know more about how we impact the environment.

Although a significant number of crewmembers reported positive attitude shifts towards the environment as a result of their experiences within the CCP, it is important to note that several other crewmembers also reported that they did not feel they had experienced a positive shift in attitudes during their time in the CCP.

Many crewmembers felt they held pre-existing positive feelings towards the environment prior to entering the CCP, and that these prior attitudes had not been impacted by experiences within the CCP. "I think that the attitudes that you come out here with are one that you keep for the environment, like you wouldn't be out here if you didn't care" (Colleen, DNF3). While the program might have taught them certain skills for preventing or solving environmental problems, or knowledge about the environment

specific to the context of their CCP, their overall attitudes towards how they felt about the environment remained unchanged. As one participant noted, "I actually don't think that my attitude towards the environment, I've always been pretty pro-environment, I don't think my attitude has really changed much" (Derrick, DNF3). Other crewmembers, such as Micky from the NCNP, provided similar responses: "No, not really. I've always had strong feelings about the environment and stuff."

Other crewmembers also reported that while the CCP might have affected their attitudes towards the environment, these impacts were minimal at best. Crewmembers that reported minimal changes in attitudes were prompted to give examples of how these small shifts might manifest into feelings or action. Most participants identified small increases in feelings of awareness and respect for the environment, and minor action skills, such as 'maybe' learning more about environmental issues or 'maybe' participating in restoration projects. However, many of these participants also commented on how, due to the very nature of the CCP (i.e. being a backcountry trail restoration program), very little of the environmental learning experience, and thus the impacts on their attitudes towards the environment were transferable to their everyday lives was possible.

Finally, others expressed difficulty in trying to identify whether their attitudes had changed. Several crewmembers noted that because they were still in the program, it was difficult to evaluate whether their overall attitudes towards the environment had been impacted. As one participant noted:

> I'm not too sure my attitude has changed that much....it's kind of hard to believe that this could just change my attitude. Maybe I need to go back and see if I look

> at things in a different way, because I'm still out here so I don't know. I haven't been back so I don't know if it has changed or not (Spencer, DNF2).

Similarly David, from the DNF3 crew, remarked that "I think it's just being out here, having the experience, has probably changed my attitude but I just can't really tell".

Many participants spoke of the need to return to their normal routines after the CCP in order to see if the program had significantly impacted their attitudes and feelings towards the environment, as well as whether the CCP had influenced them to work towards solving and/or preventing future environmental issues.

Post-test Results on Perceived Attitude shifts

In addition to the data collected from participant interviews, one section of the post-test questionnaire was designed to collect data measuring perceived attitude shifts. Participants were asked to rate their perceived attitude changes as a result of their participation in the CCP. Three attitude-specific statements were presented, and participants were asked to choose from five answers ranging from 'Strongly Agree' to 'Strongly Disagree'. Statements within this section were selected based on their representation of the CCP draft objectives. Data collected from this inventory were analyzed qualitatively and is reported as follows.

Overall, most crewmembers responded favourably to the majority of the inventory items, selecting either 'Strongly Agree' or 'Agree'. For example, when asked if, as a result of participating in the CCP, they felt more responsible for conserving and protecting nature, 92% selected 'Strongly Agreed' or 'Agreed'. A second question, which asked participants to rank whether they were more motivated to work towards

solving environmental problems, received only slightly less favourable results, with 77% responding that they 'Strongly Agreed' or 'Agreed', 19% responding they were 'Neutral' and 4% stating they 'Strongly Disagreed'. Similarly, when asked if, as result of participating in the CCP they had a greater appreciation for nature, 77% of the participants choose 'Strongly Agree' or 'Agree', 15% responded they were 'Neutral' and 7% stated they 'Strongly Disagreed'.

Attitude Results Summary

To summarize, shifts in attitudes in both perceived and demonstrated attitudes were measured. The majority of the quantitative results reflect no significant difference demonstrated between attitude post-test scores and attitude pre-test scores. Qualitative data gathered indicated that a significant number of crewmembers felt that, as a result of their participation in the CCP, their attitudes towards the environment had positively shifted. These crewmembers identified a number of ways in which they felt their attitudes had shifted. By looking for patterns in the crewmember responses, three themes emerged: (1) increased awareness and appreciation; (2) increased empowerment; and (3) motivation to take action. Several crewmembers also spoke of the difficulty in trying to identify whether their attitudes had changed while still involved in the CCP. Finally, a few crewmembers indicated that despite their experiences with the CCP, their attitudes towards the environment had not shifted.

Research Question Three: Environmental Skills

Do participants of the CCP gain new skills to work toward solving and preventing environmental problems? If so, what new skills are gained and how will these new skills prevent environmental problems?

It was expected that while participants would enter the program with low to moderate levels of environmental skills, they would demonstrate an increase in skill levels through their participation in the CCP. Similarly the CCP, as demonstrated through their draft goal statement, anticipated that participants would demonstrate an increase in environmental skills even though specific environmental skills were not defined by the CCP.

Pre-test and post-test questionnaires and interviews were used to obtain skills-related data. Data collected through questionnaires are reported qualitatively. Results are organized as follows. The expectations surrounding skills development held by participants as they entered the program are discussed first. Next, new skills identified during participant interviews are stated. Finally, results from post-program surveys addressing skills developed are reported.

Pre-Program Skills Expectations

In order to measure whether participants held any expectations surrounding learning environmental skills prior to their participating in the CCP, the pre-test questionnaire asked two questions relating to skills expectations. Thirty-four responses were collected.

In regards to the first question, "I expect that I will learn new skills to work towards the solution of environmental problems", seventy-nine percent of the crewmembers responded that they either strongly agreed or agreed that they would learn new skills to solve environmental problems during the CCP.

The second question on the pre-test questionnaire asked participants to rank their expectations as to whether "learning skills to prevent environmental problems would be an important part" of the CCP. Eighty-five percent of crewmembers responded that they either strongly agreed or agreed that learning to prevent environmental problems would be an important part of their CCP experience. Nine percent reported that they disagreed that learning skills for solving environmental problems would be an important part of their CCP experience. The remaining responses selected 'neutral'. Overall, a great majority of CCP participants reported having expectations that they would learn skills to help to solve and/or prevent environmental problems through their participation in the CCP.

Skills Learned

Mid-way through their programs, each CCP was visited by the researcher who interviewed the participating crewmembers. During the interviews participants were asked whether they felt they were learning new skills for helping the environment, and whether they felt these new skills could be applied towards helping the environment in the future (i.e. after the CCP). The purposes behind these questions were to examine if the 'gaining skills' component of the CCP goal statement, when viewed through the participants' perspective, was being met. Results regarding skills development identified

by participants during the CCP are organized and reported as follows: new environmental skills identified by crewmembers are reported first, followed by a description of the participants' perceptions of the relevancy of these skills towards future endeavours to help prevent or solve environmental problems.

A strong majority of crewmembers interviewed (89%) reported they felt they had learnt new skills for helping the environment throughout the CCP. Only two participants reported that they felt that they hadn't learnt any new environmentally related skills during their time with the CCP. Neither participant that responded negatively elected to elaborate on their responses, despite prompts from the researcher.

Participants that indicated that they were learning new environmental skills during the CCP were prompted to elaborate on what these skills were, as well as how these skills might be used in the future. A multitude of responses were recorded and upon analysis, two broad themes emerged from the data: 'soft skills' and 'hard skills'. Upon further analysis, each broad theme was broken down into sub themes. In regards to 'soft skills', two sub themes emerged: (1) teamwork and communications, and (2) personal resourcefulness and adaptability. In regards to 'hard skills', four sub themes emerged: (1) camping skills; (2) backcountry cooking; (3) trail work; and (4) tool use. Each theme is described separately.

Teamwork and Communications. The importance of learning to work co-operatively and communicate effectively in order to both complete their conservation work projects as well as peacefully co-exist within their base camps was raised by several participants. A significant majority of crewmembers interviewed reported that, during

their participation in the CCP, they felt they had increased their teamwork and communication skills. Many participants spoke of their experiences in having to demonstrate good listening skills, patience, and an acceptance of participant diversity in terms of both lifestyles and opinions, in order to work as a member of a healthy and functioning crew. As one participant noted:

> A big skill I've learned is, I am pretty open, but at the same time I am with these seven people, twenty-four/seven and you have got to be able to voice your opinion but not act as if you're trying to ply it on them...You tell them how you feel...You learn a lot more people skills than you normally do. I've gained open-mindedness towards people (Kaity, DNF2).

For many crewmembers, this was their first time living and working with a group of strangers, and several commented on how they had to learn how to adjust to different perspectives and routines. As one crewmember commented "you have to be open, open to lifestyles and how they live, because if you're not, then you're going to have a lot of problems" (Meredith, GGNRA2).

Other crewmembers compared their teamwork experiences within the CCP to other events. Such is the case with Sharada (DNF1), who compared her experiences in communicating with team members on a different volunteer project to her experiences with the CCP:

> I remember I did this one thing for *Habitat for Humanity*...I was helping them lift some heavy carpets and I just hated the fact that they wouldn't even say "1, 2, 3" or like "Is everybody ready"? The person in the front would go ridiculously fast and everyone would have to scurry. But like here, you have to be like "Are you

okay?" and, "We are going to lift it on 1, 2, 3." You have to cooperate and you have to listen to each other because you are around each other all day, so how can you not listen to each other? You can't not!

Overall, learning to work, live and communicate efficiently as part of a diverse team was an adjustment that many crewmembers reported making. Table 25 summarizes just a few crewmembers responses surrounding teamwork and communication.

Table 25

Participant Responses – Teamwork and Communication

Participant	Participant Response
Jim, GGNRA1	I learned people skills better, like getting along with people. Usually when I spend a long time with my friends we'll get into fights, but here…you learn how to live with people. Know what to do and what not to do to get on people's nerves.
Rachel, GGNRA1	It's really amazing because I thought I would be so annoyed with most of them by now…and some of them can snap at each other or their habits <but> I've learned to back away and let them cool off.
Shawna, DNF1	Patience. I've learned about how intolerant I can be but how tolerant I have to be...I think it if people want something different done you can work together, and so I think it helps me see how different people can be and know that I have to work with them and understand their point of view and where they're coming from them.

Table 25 continued

Participant Responses – Teamwork and Communication

Participant	Participant Response
Mark, DNF2	You have to know people you're working with, know pet peeves, know who to offer help to, how not to annoy people, be aware of who you're working with and their attitudes, how to read them.
Spencer, DNF2	Everything that's decided here has to be a group decisions, and everyone helps with all the chores. It's not like one person does dinner and one person clean up. Everyone kind of chips in and helps…you got to defiantly use teamwork.
Derrick, DNF3	Definitely working with people, with others my age. I'm not often able to easily get along with people my age; I've never gone to a non-adult party before. I've gotten a lot of learning of people from being out here and I imagine I'm a lot better for it.
Ben, DNF3	I've always had a stable group of friends…so coming out here…I'm not going to know any of these people, what if I don't get along with any of these people…<but> it was kind of cool making friends and being able to deal with new situations and new people. I guess it was something that was always inside of me and it was just brought out because I was introduced into this situation, rather than learn like someone has taught me, how to befriend people that you've never known or seen before, be able to work with them.

Table 25 continued

Participant Responses – Teamwork and Communication	
Christy, GGNRA2	It's been really important to get people involved and also to communicate with people, if I'm going to work on a project with you, I have to be able to communicate or talk with you in a way that we both understand so that if I say 'this' you won't take it the wrong way.

Personal Resourcefulness and Adaptability. A second 'soft skills' sub theme to emerge from the data surrounding skills development was an emphasis by crewmembers on personal initiative and adaptability skills. For some, this translated into learning how to adapt to new and often unexpected situations. For others, this included developing and/or maintaining a belief in one's self and one's abilities:

> Because you have to believe in yourself and others before you can actually hold that Pulaski and start swinging it…Like, in the beginning of this program we were picking up rocks with three people but…<now> we can pick up <rocks> with two people and we wouldn't even struggle with it. Our rocks get bigger and bigger and bigger because we know we can do it. Unlike before, we didn't know we could do it and it seemed so it seemed so much harder (Sharada, DNF1).

Many crewmembers also spoke of learning to be resourceful and how to improvise during the CCP. For several crews, because they were situated deep within the backcountry, the luxury of extra resources such as a wider variety of tools was limited.

Learning to make do with what was available was often a reality, and the ability to cope with this reality was translated into a skill by several crewmembers.

> I didn't know you could use a string and a piece of tarp and make a whole roof for a kitchen. Being able to improvise on the material things that you have. I have a string and I knife and I need to make "blank". Being able to improvise with what you have. Like using a piece of plastic and a string and all of a sudden you have a wind block (Kaity, DNF2).

Other crewmembers spoke of learning how to go without personal luxuries, additional cooking supplies, and excess materials for trail construction. As one participant noted, "we just learned to use what we have" (Eva, DNF2).

Camping Skills. During the interviews several participants commented on how they felt their camping skills had increased during their time in the CCP. For many crewmembers, the CCP was the first times in their lives they had camped without their family members, and thus had been required to shoulder increased responsibilities in both striking and maintaining camp. Others spoke of learning camping skills that differed or contradicted learning generated during previous experiences with family and friends. Generally consistent across all participant responses was a high level of enthusiasm towards attainment of new camping skills, and an eagerness to utilize these new skills again in the future. Similarly, many crewmembers expressed both satisfaction and pride in learning new camping skills during the CCP. Table 26 summarizes a sample of crewmember responses surrounding learned camping skills.

Table 26

Participant Responses – Camping Skills

Participant	Participant Response
Camilla, NCNP	Camping, stuff like putting up the tents, I definitely didn't know how to do that, I mean like I did, with my dad, but he was like "put this here" so you're kind of doing what they're telling you but here I actually learn how to do it.
Shawna, DNF1	I have never used a propane stove. I've always needed help making the campfire and now I can do it by myself. I put up a tent by myself.
Kaity, DNF2	My family has always dug trenches if it going to rain…here they are like "Don't do that. We will just put a tarp over it and it sheds the water off". I was like "Oh!", you know? I've learned a hundred <feet> from the latrine to the food to the tent. You learn pretty basic camping skills. I never knew how to start a fire!
Jesse, DNF2	…the importance of warm clothing, or if your sleeping bag is really airy and you fill it up with clothes you'll stay warmer. Or if you have to go to the bathroom and you don't because you'd be colder at night, than if you just get up and go. Another stuff like that. Hanging food. I've never had to do. Coping with being out here in the middle of the night and hearing noises.

Generally, crewmembers reported on the technical aspects of learning to camp. Topics such as learning to build a fire, learning personal first aid skills, and assembling tents and cooking shelters received generous attention from participants when discussing camping skills learned during the CCP.

Backcountry cooking. A second 'hard skills' theme to emerge was that of backcountry cooking. A significant number of crewmembers indicated that for the first time they were responsible for cooking for both themselves as well as others. Similar to the feelings expressed above surrounding new camping skills, crewmembers expressed high levels of enthusiasm and pride in learning to cook within the camp setting. Some crewmembers considered mastery of the portable backcountry stoves to be a great new skills asset; others took pride in creating meals that were enjoyed, or at least considered palatable, by their crewmembers, was a significant success. Table 27 contains participant responses to backcountry cooking skills development.

Table 27

Participant Responses – Backcountry Cooking Skills

Participant	Participant Response
Abby, DNF1	I've never really cooked before. I've never really had to. Sharada and I...we've been paired together for dinner and we always get so excited. It is so weird. Because it's like "why are you so excited about making food?" But we always look forward to it...because you've never done it before. It's like kind of something we've learned out here that we can actually use.

Table 27 continued

Participant Responses – Backcountry Cooking Skills

Participant	Participant Response
Rachel, GGNRA1	I'm cooking bread! We have to cook our bread every other day. We cook it over the camp stove, in a metal box; SCA has this bomber bread recipe.
Jim, GGNRA1	I've learned how to cook better than I did, and I learned how to cook bread and I know a few more recipes.
Colleen, DNF3	I learned to cook better in the backcountry, with small little stoves. I've never cooked for eight people on them. Nobodies had any complaints about what I've made!

Trail Work. A third theme to emerge during data analysis of the 'hard skills' was that of trail work. Similar to camping skills and backcountry cookery, several crewmembers expressed significant amounts of satisfaction in learning not only how to maintain and/or restore degraded trails but in also succeeding at demanding projects. Many of the crews found themselves at one point or another involved in significantly challenging restoration tasks. For example, one crew was asked to rebuild an extensive section of rock wall designed to act as a retaining barrier against slope erosion. This particular project involved massive amounts of soil excavation and materials transporting, the movement of rock slabs easily weighing several hundred pounds, and construction of several bridges, all with only natural materials to work with. During the interviews, crewmembers enthusiastically described their sense of accomplishment in

having finished the project, as well as their comprehension of what skills it took to achieve this end result.

> I've learned stuff out here like making rock walls without anything that sticks together. We made a wall that you can dance on! A horse can step on it and it won't move just because it is fitted on a rock properly. I mean that's something, that's really something! (Kaity, DNF2).

Other crewmembers also spoke of their newfound appreciation for what it took for even the simplest projects to be completed.

> I never knew there was so much involved in just putting in a drainage ditch, we put that culvert down there and that took a lot more than I knew - carpentry, working with the bridge, putting in foundations, general work skills, etc (Peter, GGNRA2).

Overall, a significant number of crewmembers identified learning to restore and/or maintain degraded trails as an important new skill learned during the CCP.

Tool Use. The fourth theme to emerge from the 'hard skills' data was that of tool use. Again, as with other themes described within this section of the results, a significant number of crewmembers expressed delight and personal satisfaction in learning how to comfortably and adeptly use various tools during the CCP. From crosscut saws to Pulaskis (a tool combining an axe and a shovel) crewmembers reported a strong increase in their abilities to use tools to work on environmental projects. Table 28 captures a few participant comments surrounding learning to use different tools.

Table 28

Participant Responses – Tool Use Skills

Participant	Participant Response
Rachel, GGNRA1	Definitely! I didn't know how to axe or chop wood or anything. Like before when I tried to, at my grandfather's camp I would try to chop wood and I would never hit it in the same place twice. But here I can actually aim now and actually chop what I want to chop.
Meredith, GGNRA2	A lot of the power tools and stuff I'd never used before, like drills, to put the bridge together.
Spencer, DNF2	I just learned how to use all the tools that we've been using, like the saws.
Robyn, DNF3	I've definitely learned how to use the tools, that's a big one. Cross cut, bow saw, Pulaski, the double-bit, the drawknife. Them all!
Camilla, NCNP	I feel really confident using the tools; I know how to use them.

During the interviews participants were prompted to consider how the skills they had learned during the CCP might be relevant towards future efforts for preventing or solving environmental problems outside of or after of the CCP. Participant responses were mixed.

Many participants felt that the skills they had developed during the CCP, whether they are hard skills or soft skills, were of direct relevancy to their overall lives as well as to helping to solve and/or prevent future environmental problems. Skill areas including

teamwork and communication, personal initiative and adaptability, and camping skills were reported to have the potential to be relevant towards solving future environmental issues. In particular, many crewmembers identified teamwork and communication skills as having the most relevancy towards future environmental endeavours:

Table 29

Participant Responses – Relevancy to Crewmember Lives

Participant	Participant Response
Shawna, DNF1	I think it if people want something different done you can work together, and so I think it <the CCP> helps me see how different people can be and know that I have to work with them and understand their point of view and where they're coming from them.
Peter, GGNRA2	I guess getting along with a group that you've never met before. It's kind of like going to college and you have to live with a group of people and so you have to do what's good for you as well as what's good for the group as well. <Prompt: Can you see that as being helpful for preventing or solving environmental issues later on in life?> I think that if you're capable of getting along with a group then you work better with a group and that would pay off eventually.
Sharada DNF1	You run into people all the time. You have to tell them in a way that doesn't offend them if you want to educate some people…to

Table 29 continued

Participant Responses – Relevancy to Crewmember Lives

Participant	Participant Response
	get your point across. I always envisioned myself leading trails or…telling stories on the trail to children or something so that they know more about the environment. You need to work together to solve problems and there are organizations everywhere…and you need to work with other people so that they can support you.
Spencer DNF2	I guess any work that you do, working together would be helpful, because unless you're a one-man operation, anything you're to go into would most likely involve working with a team and that would most definitely help.

Other participants thought that the skills that they learned through the CCP would only be useful if they decided to go into particular career fields, such as backcountry firefighters, park rangers or trail rehabilitation workers.

> It would definitely help me only if I was to go on into a field that involved the environment, for example, firefighting or anything like that, it would definitely be something. Because you get to do a lot of camping, hiking, especially with firefighting, you got to defiantly use teamwork (Spencer, DNF2).

Similarly, crewmembers noted that trail-building skills would only be utilized in the future if they were to choose a career path that actively involved trail restoration. And surprisingly, few crewmembers indicated that camping skills learned during the CCP

would be useful in helping to prevent future environmental problems. Despite participant responses that they had learned camping skills and, as previously reported under knowledge results, they had increased their understanding of the relationship between low impact camping and environmental stewardship, few participants noted that they saw themselves applying these camping skills to future experiences.

Others crewmembers felt strongly that some, if not all, of the skills that they had learned during the CCP were specific only to the CCP and either would not, or could not be applied in the future. Many crewmembers identified that the unique aspect of the program, that being conservation of nature, centred on trail restoration and maintenance and resulted in skills development that were only applicable to circumstances similar to the CCP. As one participant, Camilla, noted, "I would love to use those tools again, and I'd like to do it <trail work> again, but who knows if I'll ever have the chance to do that sort of thing" (NCNP). Overall, many crewmembers had difficulties identifying how they would be able to apply skills learned during the CCP to future environmental issues.

Participant Reported Post-Program Skills Results

On the post-test questionnaire crewmembers were asked to rate whether they felt they had learned any new skills for minimizing their impact on, or for helping, the environment. Six questions designed to reflect the draft objectives as well as the general nature of the CCP were asked. Overall, most crewmembers responded favourably to the majority of the inventory items, selecting either 'Strongly Agree' or 'Agree'. For example, when asked if, as a result of participating in the CCP, they felt they could identify and apply Leave No Trace principles to their outdoor experiences, 54% selected

'Strongly Agree' and 42% selected 'Agree'. Similarly, when asked to rate if their confidence in using a stove to cook meals in the backcountry had increased as a result of their experiences with the CCP, 96% chose either 'Strongly Agree' or 'Agree'. Other inventory items that also received scoring that reflected a positive shift in knowledge levels included working as part of a team to help prevent environmental problems (84% 'Strongly Agree' or 'Agree'), learning new skills for restoring environmentally degraded areas (88% 'Strongly Agree' or 'Agree'), and learning to travel safely and lightly in the natural environment (88% Strongly Agree' or 'Agree'). In only one skills inventory item did crewmembers responses reflect a less than favourable shift in environmental skills acquisition. When asked to rate if their abilities to use a compass and map improved during the CCP, only 34% of the crewmembers relied 'strongly agree' or 'agree' whereas 27% replied 'disagree' or 'strongly disagree' and 39% stated they were neutral.

Skills Results Summary

To summarize, shifts in skills were measured and reported on as follows: first, participant pre-program skills expectations were measured; next skills development during the CCP were reported; and finally, results relating to post-program skills development were stated. A majority of CCP participants reported entering the program with moderate to high expectations surrounding learning new skills to help prevent and/or solve environmental problems. During the CCP, participants reported a number of new skills learnt, which were loosely grouped under two themes, 'soft' skills and 'hard' skills. Sub themes that emerged under each of the themes included teamwork and communication, personal initiative and adaptability, camping skills, backcountry

cooking, trail work, and tool use. Participant responses as to the applicability of these new skills towards preventing and/or solving environmental problems were mixed. Some participants reported new skills learned would definitely be relevant towards their attempting to resolve future environmental problems, while others reported that only select new skills would have limited future relevancy towards environmental issue problem solving. Yet others reporting that, due to the unique nature of the CCP, skills learned during the program would not be useful in the future unless applied again under the CCP, or a similar program.

Results Summary

Altogether, a considerable amount of data surrounding the impacts of the CCP on participants' environmental knowledge, attitudes and skills were collected. While various data collected supports the idea that the CCP did positively affect the domains under study, other data rejected this idea. Generally, qualitative data gathered through participant interviews and journals tended to support the idea that the CCP positively affect participants' environmental knowledge, attitudes and skills. Conversely, quantitative data collected through pre- and post-program questionnaires generally reflected that participant levels of environmental knowledge and attitudes towards the environment were not positively affected by the CCP. A more in-depth analysis of the results of this research study in light of the research questions is presented in Chapter Five.

CHAPTER FIVE

DISCUSSION

Chapter Five presents a discussion of the research project results. The chapter begins with a summary of the research project. Next, research findings are discussed in relation to the study research questions. The relationships of the findings to other research study results are also discussed. Following this, the implications of this research study on CCP environmental education program planning and practice are discussed, and recommendations for more effectively implementing environmental education within the context of the CCP are made. Finally, suggestions for future research are offered.

Discussion of Knowledge Results

As reported in Chapter Four, both perceived and demonstrated knowledge were measured. It was expected that through their participation in the CCP crewmembers would increase their levels of environmental knowledge. While qualitative data gathered suggests an increase in crewmembers levels of environmental knowledge did occur, quantitative data suggests otherwise.

Qualitative results gathered indicate that a significant number of participants reported pre-program expectations of increasing their environmental knowledge levels, yet few crewmembers were able to explicitly articulate what these expectations were. For those crewmembers that did identify specific expectations, additional data was collected, and three themes emerged: camping and wilderness living; stewardship and conservation; and basic ecological concepts. From the data generated it can be inferred

that the majority of participants do not enter the CCP with high level expectations regarding increasing environmental knowledge levels. When viewed in consideration of their articulated motivations for joining the CCP (i.e. to travel, get away from home, gain work experience, etc.), it is not surprising that participants had difficulty identifying what they expected to learn, for few appeared to fully consider environmental education prior to the CCP program, if at all. Whether it is fair to ask participants to identify expectations is worth considering, as motivations for joining appeared to be both multi-faceted and, for many participants, difficult to articulate.

During the program, participants identified a number of knowledge-related topics they felt they were learning. Seven themes emerged from the data: (1) environmental stewardship; (2) Leave No Trace/low impact camping; (3) forest management; (4) flora and fauna identification and knowledge; (5) curbing consumption and the three 'R's'; (6) general ecological concepts; and (7) the role of resource agencies. It is important to note that during the interviews participants may have only reported on the topics that were foremost in their minds. They may have learned a great deal more surrounding ecological concepts, environmental issues or stewardship strategies during the CCP that was not articulated during their interviews. It is not inconceivable that much of this 'unacknowledged learning' could only be measured over time, if at all. For example, a participant might speak of the importance of leaving a fallen tree so as not to disrupt the environment around it without articulating, or indeed realizing, the subtle, more important underlying ecological processes, such as the role of the fallen tree in nutrient cycling or providing critical habitat.

On the post-test questionnaire participants were asked to rate their perceived knowledge changes as a result of participating in the CPP. Twenty statements based on individual representation of CCP draft objectives were presented. Qualitative results indicated that participants either 'strongly agreed' or 'agreed' with the majority of the inventory items; for only a few inventory items did crewmember responses reflect a less than favourable shift in perceived environmental knowledge acquisition. Inventory items that received lower ratings, thus suggesting a less favourable shift in environmental knowledge acquisition included questions relating to areas of past and present land use, the role of government agencies, and environmental legal issues. As these statements are based on the CCP objectives, it is worth considering whether the objectives themselves are relevant to the general nature and operations of the CCP. Are the objectives representative of what should and can be learned during the CCP? This question is address in further detail below.

Quantitative data gathered reflects no significant difference demonstrated between knowledge scores post-test and knowledge scores pre-test over or between crews. These results reflect the findings of other researcher studies that also addressed changes in participants' environmental knowledge levels following non-formal environmental education experiences. Hanna, in her 1988 study of outdoor program impacts on the environmental knowledge levels of Outward Bound participants found that participants' demonstrated a decrease between pre-test and post-test measures of environmental knowledge. Similarly, Kellert (1998), in his longitudinal study of the effects of three outdoor programs – Outward Bound, SCA, and the National Outdoor Leadership School

– also reported the programs having marginal affects on participants' environmental knowledge levels (p.184):

> A particularly disappointing result was the marginal affects on participants' environmental knowledge...we saw only limited improvements in factual knowledge of natural process and diversity...as well as more complex understandings of the biophysical environment (e.g., ecology, geology, hydrology). We rarely observed greater environmental awareness and appreciation being accompanied by deeper understanding of ecological structure and process (p.184-185).

Others who studied both nonformal outdoor programs and school-based environmental education programs also reported obtaining similar results (Hausbeck et al., 1992; Leeming et al., 1995; and Leeming et al. 1997).

However, it is important to note that the results of the current research study are not consistent with the results of other studies that also investigated the effects of wilderness experiences on environmental knowledge levels. For example, Gillett et al. (1991) found that high-school students who participated in a wilderness camping experience demonstrated an increase in environmental knowledge levels. Similarly, Keen (1991) determined that through participation in a Sunship Earth program youth increased their ecological knowledge significantly. Bradley (1995) also found an increase between pre– and post-test knowledge scores of students participating in an environmental education intervention. However, positive shifts in knowledge scores in Keen and Bradley's' studies could possibly be attributed to the use of an established environmental education curriculum, thus helping to reconcile the inconsistency of these

findings with those of the current research study. However, Gillett et al.'s results are more difficult to understand as the programs studied by the researchers did not use a formalized curriculum, and involved extended wilderness exposure through camping and backpacking. These are program attributes shared with the CCP.

There are a number of possible reasons as to why quantitative knowledge scores did not demonstrate a significant difference over the duration of the CCP. It could be concluded that either the inventory items selected, which were based on the CCP objectives, were not appropriate given the context of the CCP. These inventory items, while perhaps appropriate for measuring the effects of programs with a more formalized and/or school-based environmental education curriculum, were not effective within the context of the CCP. Building on this idea, it can be questioned as to whether the environmental education objectives of the CCP are appropriate. What 'sort' of knowledge is important for crewmembers to be learning? Is it facts and statistics about the environment? Plant and animal identification? School-based, testable concepts? For example, is it important for participants to identify a minimum of three animal species within their immediate environment as well as their role and interdependence in the ecosystem? Or is it more important for crewmembers to learn about more broad-based ecological principles that are transferable from ecosystem to ecosystem. For example, instead of the objectives as currently outlined, crewmembers could be taught about not only the interrelationships among organisms, and between organisms and their environments using locally observed relationships as examples, but also how this concept relates to their crewmembers home environments. In this way, the environmental concepts learned take on a greater meaning when they can be applied to environments

outside of the CCP. As Haluza-Delay (2001) notes "wilderness leaders need to be careful in program design and (must) work to facilitate effective transfer of learning to the home context; they need to directly address the nature-civilization dichotomy" (p. 48).

A second reason as to why quantitative environmental knowledge scores did not demonstrate a significant difference between pre- and post-tests might be attributed to crewmembers being misinformed by crew leaders during their programs. As noted in Chapter Four, a significant number of crewmembers noted the important role that crew leaders played in teaching environmental education within the CCP. Yet, with a lack of consistency in crew leader training and thus an understanding of baseline crew leader levels of environmental knowledge, the possibility exists that crew leaders may have unknowingly taught participants ecological concepts that were in fact incorrect. For example, this could range from misidentifying plant or animal species to incorrectly describing key ecological processes such as nutrient cycling or predator-prey relations. Other researchers have raised the possibility of such 'mis-education' (Hanna, 1988).

To summarize, a discrepancy between qualitative and quantitative results surrounding environmental knowledge was uncovered. It could be considered that quantitative methods used, while based on CCP objectives, were inappropriate in measuring the true impacts of the CCP on participants' environmental knowledge. Through qualitative methods (interviews and participant journals) crewmembers were more able to identify what they felt they had learned during the program. But it is important to note that what was reported by participants may represent only what was 'first and foremost' in their minds, and that other, more subtle learning that positively affected their environmental knowledge levels, might not have been reported. In

addition, data collection methodologies must be considered. The question can be raised as to whether the questionnaires employed were appropriate in terms of gathering knowledge information given the context of the CCP. While questionnaires are often used successfully to measure for knowledge gains, instruments such as those used may not necessarily be effective within the CCP when probing for specific environmental knowledge that was in fact learned. As Lemburg (1997) notes the amount of environmental learning that individuals may absorb on an environmental course can be attributed to both "formal teaching and the direct, subtle effects of the wilderness" (p. 39). It is these direct, subtle effects that are often more difficult to measure.

Overall, while a discrepancy between qualitative and quantitative results arose in terms of environmental learning, a significant number of crewmembers did report during the interviews that their levels of environmental knowledge had been positively affected by the CCP. Whether the CCP objectives are an accurate representation of what sort of environmental knowledge learning occurs and thus can be measured during the CCP is a question worthy of consideration.

Discussion of Attitude Results

As reported in Chapter Four, both perceived and demonstrated attitudes were measured. It was expected that through their participation in the CCP crewmembers would demonstrate a positive shift in environmental attitudes. Similar to the knowledge results, qualitative and quantitative data gathered reported mixed results. Data gathered surrounding attitudes are both consistent and inconsistent with the findings of other

research studies that also investigated the impact of environmental education programs on individuals' attitudes towards the environment.

The quantitative results reflected no significant positive difference demonstrated between attitude pre– and post-test scores, either between crews or across all subjects. However, a decrease in demonstrated environmental attitudes following an environmental education program is not unique to this research study. Gillett et al. (1991), Keen (1991), and Shepard and Speelman (1986) also all reported either a lack of, or in some cases, a decrease in environmental attitudes held by participants of environmental education programs.

By sharp contrast, qualitative data gathered indicated that a significant number of crewmembers felt that, as a result of their participation in the CCP, their attitudes towards the environment had positively shifted. During the interviews, nearly forty percent of the crewmembers reported that their attitude towards the environment had 'definitely' been affected positively. Similarly, qualitative results from post-test questionnaires indicated that the majority of crewmembers (92%) felt more responsible for conserving and/or protecting nature, and 77% expressed motivation to both work for the environment as well as having a appreciation of it.

Three themes emerged from the interview data that suggested participants attitudes were positively affected: 1) increased awareness and appreciation; (2) increased empowerment; and (3) motivation to take action. These findings correspond with those of Kellert (1998) who also noted "most respondents reported far greater respect, affinity, appreciation, and sense of...connection with the natural world as a consequence of their outdoor experience. Most professed a stronger commitment to conservation and

stewardship of the environment" (p. 184). Other researchers have also reported significant positive shifts in attitudes towards the environment after participants' experiences environmental education interventions (Bradley et al., 1999; Hanna, 1988; Leeming et al., 1997).

Yet a few crewmembers indicated during the interviews that despite their experiences with the CCP, their attitudes towards the environment had not shifted. Others reported that, because they entered the programs with positive attitudes towards the environment to begin with, they had not expected a change to occur. These findings are similar to those of Eagles and Demare (1999), who also measured the effects of multi-day environmental education program on youth's attitudes towards the environment.

It is also important to consider participant's reported desires to 'take action' after leaving the CCP. As reported in Chapter Four, many participants reported during the interviews that they were motivated to take further action towards helping the environment after the CCP. However, two considerations of these crewmember reports should be recognized. First, there are currently no systems in place within the CCP to either support or monitor this. Whether students actually do take action post-program remains questionable. The fact that crewmembers reported that they would take positive action is at least an indicator of their pre-disposition to protect and conserve the environment. Without proper support or monitoring measures, the CCP can only assume that these actions occur. Second, many of the action responses given by the participants included activities such as having shorter showers, saving electricity or composting. These data corresponds with that gathered by Lemburg (1997) during her study of Colorado Outward Bound students. As the researcher notes:

> A number of...canned answers (were given)...those who answered simply wrote things like recycling or not littering. This could indicate...that they have been so overwhelmed by environmental education efforts in school...that they remember particular words such as recycling, but do not really understand the 'whys' behind them. Another is that they do not know how to act upon the environmental learning they have accumulated...they have not been given the 'tools' to make it possible for them to take action in their daily lives (p. 49-50).

While interview participants seemed sincere, and often enthusiastic in their expressed plans to 'take action', without follow-up measures in place to both support and measure whether these actions actually occurred, follow-through remains questionable. It would serve the CCP well to develop strategies to continue supporting participants in taking action towards helping the environment after their experiences in the CCP.

It is also worth discussing whether a shift in attitudes can be accurately assessed both during as well as directly after a program. Again, it is often difficult to recognize the impacts of a program on personal attitudes when immersed in that particular program. Furthermore, it is generally acknowledged that the impacts of environmental education interventions are often difficult to measure, and often only become apparent over the long term. It is interesting to consider that some research projects (Dettmann-Easler, 1999; Dresner & Gill, 1994) that report participants demonstrating a positive shift in environmental attitudes are often studying programs of short duration (i.e. < five days). Is it realistic to conclude that such brief programs can make a significant impact on participants' attitudes? Rick Kool, a prominent British Columbian environmental educator, once remarked "the real things, the ways in which environmental education can

change someone's life, are much more subtle and difficult to measure" (Kool, 2000, p. 31, as reported in Hoffman & Thompson, 2003). Similarly, Glenda Hanna (1995) notes, "environmental education researchers have experienced frustration in evaluating the ultimate indicators of success of their programs, which would be indicated by an environmentally literate and active citizenry" (p.24). To compound the situation, it can be argued that it is not just one, but rather multiple exposures to different environmental education interventions throughout a young person's life that ultimately will shape and impact their attitudes towards the environment (Hoffman & Thompson, 2003). Who is to say what that one, significant experience may be that will ultimately cause an individual to shift their attitudes in an ecocentric manner? Of even if that one experience exists? These are the difficult constructs to measure.

But while it is often difficult to measure the longer-term impacts of an environmental education experience on participant's attitudes, values and behaviours, it is still worthy to attempt to do so, to try and measure these constructs over time. Through long-term evaluation processes the CCP staff might be able to gain greater insight into whether, through participation in the CCP, participants were further moved towards becoming environmentally literate and active citizens. This idea is elaborated below, within the recommendations to the CCP section.

Discussion of Skills Results

Results relating to the development of environmental skills were reported last. It was expected that through their participation in the CCP crewmembers would

demonstrate an increase in environmental skills towards solving and/or preventing future environmental problems.

A majority of CCP participants reported entering the program with moderate to high expectations surrounding learning new skills to help prevent or solve environmental problems. In addition, during the program a significant number of participants reported learning a variety of new skills, which were loosely grouped under two themes, 'soft' skills and 'hard' skills. Sub themes that emerged included teamwork and communication, personal resourcefulness and adaptability, camping skills, backcountry cooking, trail work, and tool use. While some participants reported that new skills learned would be relevant towards future attempts to prevent or solve environmental problems, others reported that these skills would not be useful outside of the CCP. Generally, there was consistency amongst crewmembers in identifying soft skills such as communication and teamwork, and personal resourcefulness and adaptability as being the most relevant to them in the future.

Whether or not these skills are relevant to the crewmembers lives outside of the CCP programs is questionable. It could be questioned, how important is learning to use tools such as Pulaski's or crosscut saws to participants' lives outside of the CCP? Is a demonstrated proficiency in building water bars or using an axe really that applicable towards preventing or solving environmental problems? How important are the skills learned by CCP participants in terms of future applicability and transferability to home environments'.

In consideration of the skills learned as identified by participants, one particular area stands out as being potentially relevant towards developing an environmentally

responsible citizenry, which is after all, the underlying theme of the CCP programs' environmental education goal statement. A vast majority of the crewmembers identified developing communication and teamwork skills. Furthermore, many of these participants were able to relate how these skills would be relevant in their future lives, in terms of both helping the environment and also in terms of general day-to-day life. Returning to the research conducted surrounding environmental literacy and environmentally responsible behaviour, we can see that both communication and teamwork skills, and the various components that underlie these skills such as conflict resolution, patience, and an ability to listen, have been identified as key components towards the development of environmentally literate citizens. Roth (1968) noted that individuals who held high levels of planning and collaborative/facilitative skills often demonstrated high levels of environmental literacy. Similarly, McClaren (1989) identified the ability to work co-operatively and the possession of character skills (patience, persistence and encouragement for others) as two important elements of environmentally literate citizens. It could be argued that this aspect of skills development offered forth by the CCP may in fact, help them to achieve their goal statement.

In addition, two other skill themes that emerged from the data, that of camping skills and backcountry cooking, are consistent with the findings of other research studies (Bentley, 1985; Hanna, 1988; Kellert, 1998; Lemburg, 1997). For example, Kelllet (1998) reported that 93% of participants of a wilderness-based program (Outward Bound, NOLS, or SCA) reported an increase in wilderness camping skills. Similarly, Bentley (1985) in his study of the role of backcountry experiences on middle school students found that a majority of participants learnt both outdoor cookery and camping skills. It

would be interesting to measure over time both the retention of these skills from the CCP participants, as well as the true applicability to their lives. Do crewmembers continue to participate in camping trips or cook in the outdoors after the CCP? Or are these skills with limited applicability to the future? Certainly, for many the first time a tent is put up (and stays put up) or a fire is built it can be a powerful experience. It could be thought that while participants may engage in limited camping and outdoor cooking experiences in the future, the feelings of empowerment behind learning and practicing these skills during the CCP are really the true significant outcomes. The idea that, whether it is building a fire from scratch or successfully achieving a separate goal later in life, participants leave the CCP with an increased sense of personal ability is important. This belief in one's self, and ones abilities to attempt challenging situations, is an important outcome that should not be overlooked.

Nonetheless, there remains the need to consider the relevancy of the skills reported learned during the CCP to the participants lives outside the program Furthermore, as the CCP failed to explicitly define 'skills' for helping solve and/or prevent environmental problems, it is difficult to measure whether this aspect of its goal statement was in fact reached. As many program evaluators realize, if you don't define specifically the goal or objectives for what you are attempting trying to measure, then it is very difficult to know if you succeed in achieving your goal. Recommendations for the redefining of program objectives are included further within this chapter.

Environmental Education Within the Context of the CCP

As noted above, the results from this research study are mixed. While qualitative data results generally indicate that the CCP does have a positive affect on participants' environmental knowledge, attitudes and skills, quantitative findings are less convincing. It has been suggested that quantitative results, while based on inquires that reflected the draft goal and objectives of the CCP, may not have yielded data that truly reflects the impacts of the CCP on participants knowledge, attitudes and skills. Whether the CCP's objectives are an accurate measure of the impacts of the program on these domains is questionable. This suggestion is based in part on the rich data gathered through participant interviews that demonstrate support for the CCP positively impacting these domains. Member checking of the research results also suggests positive impacts on participants' levels of environmental knowledge, attitudes towards the environment and development of environmental skills did occur. Regardless of the discrepancy between quantitative and qualitative findings, it is still relevant to ask what role, if any, environmental education plays within the CCP.

It is the opinion of the researcher that the CCP, despite its shortcomings, does contribute to fostering positive environmental literacy, but its full potential has yet to be realized. For many, the mere opportunity to experience living and travelling in the wilderness for an extended period of time is a powerful experience and may contribute to a life-changing event. The impacts of this experience can be difficult to measure, and may often not be readily observable until later in life, if ever at all. As Lemburg (1997) observes, "the psychological and physical immersion in wilderness on these courses

(are) deeply felt, and can help create the unique connection or bond out of which ecologically sensitive and lifestyles may later develop" (p. 23). Through the CCP young adults are exposed to direct contact with the out-of-doors. In addition to the sensory aspect of being immersed in nature, participants are also afforded the opportunity to remove themselves from their daily lives. This 'disconnect' from society may in fact be a 're-connect' for many young people, as they are then able to see their place within, as well as connection to ecological cycles and systems. Removed from the trappings of society, youth may for the first time experience and understand their connection to, and impacts on, the natural world. The CCP offers a unique opportunity for such a 're-connect' to occur.

During their time within the CCP the opportunities exists to share with young adults many topics related to learning about and for the environment. These include, but are not limited to, environmental philosophy and history, astronomy, meteorology, Aboriginal peoples' relations to the landscape, and various aspects of scientific testing (for example, water quality monitoring). Experiences that foster an immediate relationship to the surrounding natural environment can be powerful on many levels. These experiences, combined with developing personal interrelations skills and increased senses of personal empowerment, can greatly affect participants' levels of environmental knowledge as well as their attitudes towards the environment.

This conclusion is supported by the findings of other research studies. Much research has been conducted on the impacts of the environment on individuals' environmental knowledge levels, attitudes towards, and skills for helping the environment. Most of this research has demonstrated that, while often difficult to

measure and inconclusive at times, wilderness-based programs do have a positive impact on these domains (Emmons, 1994; Hanna, 1988; Lemburg, 1997; Sanger, 1997). On one end of the scale, it can be hoped that through their experiences in the CCP young adults will develop meaningful levels of environmental awareness and appreciation for the environment by their exposure to it, and that they will be build on these levels throughout their lives, developing the attitudes, skills, motivation and commitment to prevent and/or solve future environmental problems. And at the far end of the scale, it can be hoped that if nothing more, crewmembers' experiences within the CCP will play a small but potentially significant role in the development of a lifelong environmentally literate citizen.

However, it must be acknowledged that the roots of the CCP are inherently grounded in a worldview that is more anthropocentric than ecocentric. While the concept behind the CCP is 'service to nature', in reality this often translates, at least for many projects, into building, maintaining or restoration of trails. The service work for the environment is in fact, service work to both mitigate the impacts of, but also increase humankinds' opportunities to visit and exploit wilderness areas. In essence, much of what the CCP is grounded on could be viewed as 'service to the environment for humankind'. If this is the case, then it is the opinion of the researcher that the CCP must either address the underlying worldview on which it operates, or, at the very least, consider how it will define environmental education in light of the foundation it rests upon before it begins to meet its environmental education goal statement.

Presently, environmental education within the CCP is, by and large, delivered in an impromptu, spur of the moment manner. There is a lack of a planned environmental

education program, coupled with relevant and meaningful objectives that truly reflect the environmental education intentions of the CCP. Without objectives that adequately reflect the nature of the CCP, environmental education will continue to fall short of its mark – fostering in participants the basic principles of environmental literacy, including heightened levels of environmental knowledge, positive shifts in environmental attitudes and increased skills for preventing and/or solving environmental problems.

Other barriers that prevent the effective delivery of environmental education to participants exist. These include an identified lack of transferability of environmental learning to participants' lives, a lack of follow-up with participants to see if attitudes and motivation for actions persist after the CCP, and a lack of standardized crew leader training. The remainder of this paper involves recommendations for the SCA that may help to increase the effectives of environmental education within the CCP. As well, recommendations for future research are also offered.

Recommendations for the Conservation Crew Program

In consideration of the research findings, the following recommendations for increasing the effectiveness of environmental education integration and delivery within the CCP are offered.

Develop a Strategy for Planned Environmental Education within the CCP.

It is recommended that the SCA implement a planned environmental education program within the context of the CCP. As the North America Association for Environmental Education (NAAEE) notes "the term 'environmental education

program'...mean(s) an integrated sequence of planned educational experiences and materials intended to reach a particular set of objectives" (2004, p.6). In order to do so, it is suggested that how environmental education is currently delivered within the CCP (i.e. in an ad-hoc or spontaneous manner) be revisited. While utilization of the 'teachable moment' is important within the nonformal context, the need remains for the CCP to incorporate planned environmental education programming. Furthermore, the CCP should consider revisiting how environmental education is conceptualized within the context of the CCP itself – that is, what 'type' of environmental education is appropriate for an outdoor conservation program that is focused on service learning, largely trail restoration and/or trail maintenance. Developing learning objectives and activities that adequately represent the philosophy and history of the organization is critical.

To suggest that the CCP develop a strategy centred on planned environmental education programming is ambitious, potentially requiring a great deal of staff and material resources. One possible solution to facilitate this process is to model a draft process proposed by the NAAEE. The NAAEE is in the process of developing a document, *Nonformal Environmental Education Programs: Guidelines for Excellence* (draft, 2004) that outlines a set of six characteristics and associated guidelines for the development of nonformal environmental education programs. These characteristics provide an excellent framework for planning environmental education programming within the context of the CCP. It is the opinion of the researcher that many, if not all, of the characteristics are directly relevant to the CCP's attempts to incorporate environmental education programming into its existing operations, and that the adoption and utilization of these guidelines would allow the CCP to better understand and plan for

environmental education. Several of the NAAEE characteristics, and their relevancy towards the CCP are briefly described as follows. In addition, an overview of the guidelines can be found in Appendix H.

Conduct An External Needs Assessment. The first characteristic as outlined by the NAAEE is to conduct an external needs assessment. For the CCP, this would translate into assessing the needs of various stakeholders in regards to environmental education initiatives. CCP stakeholders include crewmembers, crew leaders, and sponsoring agencies. Included in this step would be to assess existing resources such as curriculum materials, guest speakers and community partners so that these resources could be built upon and/or utilized more efficiently. Many CCP crews are annual, operating repeatedly in the same areas and with the same host agency. It would be wise to include in the needs assessment an inventory of known resources that have previously been used to augment environmental education endeavours by past crew leaders. This could include past guest speakers or resources, or environmentally focused service-learning projects.

Assess the Internal Needs and Capacities of the Organization. The second characteristic identified by the NAAEE for planning for environmental education within nonformal organizations is to assess the organizations internal needs and capacities. In regards to this research study, this would involve assessing the internal needs and capacities of both the SCA and the CCP. This includes ensuring that planned activities and programs are consistent with the organizational priorities of the SCA and that there is in fact a need within the CCP for structured environmental education programs (p.11). In

order to so, it is recommended that the CCP staff revisit the mission of the SCA, which as outlined in Chapter One, is:

> To build the next generation of conservation leaders and inspire lifelong stewardship of our environment and communities by engaging young people in hands-on service to land (SCA, 2001).

Any environmental education lessons or activities envisioned by CCP staff need to be consistent with the priorities, objectives and mission of both the SCA as well as the CCP itself. This would include assessing the primary focus of the CCP, that being to have youth volunteers participate in conservation-based service learning projects such as trail restoration and maintenance in order to determine the most appropriate and feasible means of integrating structured environmental education into existing operations.

Revisit the Environmental Education Goal and Objectives of the CCP. The third characteristic identified by the NAAEE would direct the SCA to consider the scope and structure of possible environmental education programming with the CCP. As the NAAEE notes, this includes developing "well-articulated goals and objectives that state how the program will contribute to the development of environmental literacy" (p.11). If the underlying goal of the CCP is, in fact, to develop an environmentally literate citizenry, then the need to substantially revise existing environmental education objectives, as well as considering how to implement structured environmental education lessons or activities that would help to achieve these objectives is critical.

It is highly recommended that the CCP use this opportunity to consider developing new objectives that more adequately reflect both the nature of the CCP as well as the criteria for developing ecologically literate citizens. The current CCP

environmental education objectives are predominantly knowledge-based, with little attention given to the areas of attitude formation, skills development, or action learning. The CCP has reported a desire to retain its original environmental education goal statement (Personal Communication, 2003). If so, then the need for the underlying objectives to more accurately reflect the various components of ecological literacy as outlined within the goal statement remains.

While this may initially appear as a daunting task, especially when considering staff has already dedicated time and resources to developing an existing set of draft objectives, there isn't necessarily the need to start this process anew. Rather, one possible suggestion towards forming new objectives would be for the CCP to adopt the objectives for environmental education as stated under the *Tbilisi Declaration*. To refresh, these objectives are:

> Awareness: to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
>
> Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
>
> Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
>
> Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.

> Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (UNESCO, 1978)

By adopting the *Tbilisi Declaration* objectives, the CCP would be provided with the opportunity to expand its current emphasis on knowledge-related objectives to include objectives that are the essential underpinnings to the development of ecologically literate citizens.

Certainly, the above suggestion, to adopt the objectives as outlined by the *Tbilisi Declaration* is just that, a suggestion. Within the field of environmental education there exists a plethora of research surrounding models for developing, implementing and assessing environmental education programs (Hanna, 1995; Hungerford et al., 1980; Volk et al., 1994; Staniforth & Fawcett, 1994). Included within many of these models are well-constructed objectives that the SCA may consider adopting in whole or in parts. Ultimately, it the decision of the CCP staff to select objectives that will most accurately reflect the role of environmental education within the context of the CCP. Ensuring that program objectives extend beyond knowledge and awareness to include skills development and action learning is critical.

Regardless of whether objectives are adapted or developed anew by staff, the CCP should also consider developing prescribed learning outcomes for each identified objective. It is the opinion of the researcher that the current CCP objectives may in fact be better suited as learning outcomes. The identification of a complete set of learning outcomes would allow the CCP to put in place specific, measurable outcomes that can

then be used to assess whether CCP participants are learning in such a way that the CCP's overriding environmental education objectives are being met. Furthermore, these outcomes would provide the basis for the development of a more formalized environmental education curriculum within the CCP. This formalized curriculum would also be more consistent with state Board of Education frameworks. The development of such a curriculum is also highly recommended by the researcher.

Again, there is no need for the CCP to 'recreate the wheel' in terms of curriculum development, as a great deal of work has already been conducted in this area. For example, Rebecca Lemburg (1997) has developed a curriculum designed to introduce environmental education to participants of a Colorado Outward Bound backcountry program. The SCA might want to consider adopting components of this curriculum, which includes the following themes: aesthetics of nature; environmental stewardship; nature of earth and sky; environmental history, philosophy and ethics; natural resource management; cultural history of the land (p.62). Alternatively, the SCA may wish to investigate whether environmental education curricula has been developed by other organizations, such as the National Outdoor Leadership School, Outward Bound, Youth For Environmental Sanity, or Sierra Student Coalition.

In order to assist the CCP in developing outcomes that more adequately address the levels of learning as outlined within its goal statement (i.e. moving from knowledge to skills to attitudes to motivation to commitment), it is also recommended that particular care be given to the language used in specifying each outcome. This language should reflect the six levels of learning as developed by Bloom et al. (1956, reported in NAAEE, 2004): knowledge, comprehension, application, analysis, synthesizing and evaluation

(p.32). For example, objectives that reflect crewmembers involved in environmental education activities involving analysis would include the language of 'debate' or 'distinguish'. Objectives that reflect crewmembers involved in environmental education activities involving evaluation would be represented by language such as 'predict' or 'assess' (NAAEE: 2004). The use of such language ultimately implies action on the part of the learner; in turn, this will help the CCP to assess whether desired outcomes are being achieved.

Improve and Expand Crew Leader Training Opportunities. A fourth characteristic identified by the NAAEE and adopted by the researcher focuses on program delivery resources. According to the NAAEE, this includes ensuring that "well trained staff and support materials are in place" (p. 21, 2004). Within the context of the CCP, this directly translates into increased emphasis on crew leader training.

As previously noted, much of the current environmental education within the CCP is delivered in an impromptu manner, with little if any adherence to meeting identified objectives. At the same time, qualitative data suggests that participants view crew leaders as playing an important role in the transfer of environmental education. It is recommended that the CCP implement a standardized crew leader pre-service training program. Within this program, crew leaders would receive training in a number of areas, including orientation to CCP environmental education goal, objectives and learning outcomes; basic ecological concepts; approaches to teaching environmental education (i.e. hands-on learning, cooperative learning, inquiry, etc.); methods to teaching environmental education (i.e. skits, journaling, debates, games, stories, role playing, etc.); environmental philosophy; and environmental issues. This recommendation supports the

work of other researchers who have also identified the importance of nonformal outdoor leader in transmitting environmental education to participants (Bradley, 1995; Emmons, 1994; Hanna, 1988; Keen, 1991). As Bradley (1995) notes, "one of the hurdles environmental educators have been up against is the lack of training in environmental areas" (p. 9). According to the NAAEE's *Guidelines for the Initial Preparation of Environmental Educators* (2000), "pre-service preparation should enable educators to provide the interdisciplinary, hands-on, investigative learning opportunities that are central to environmental education" (p.13).

It is important to note that crew leaders should be trained in not just *what* topics or factual knowledge should be taught during the CCP, but also in *how* this information can be taught. Glenda Hanna, in her 1995 study on the impacts of Outward Bound and Audubon Society courses on program participants notes that outdoor leaders "must not only be taught the relevant facts, concepts and skills, but they must be trained in effective and efficient processes for delivering these messages..." (p. 253). It is recommended that crew leaders be taught a diversity of teaching strategies, including strategies that apply to the affective and behavioural domains.

Opportunities to improve and expand on crew leader environmental education training do exist. Currently, crew leaders are required to attend an annual multi-day spring meeting. During this meeting, crew leaders are trained in various aspects of trail restoration, wilderness first aid, paperwork procedures and agency protocol. This meeting, held prior to the start of each field season, is an excellent opportunity to also engage crew leaders in a series of environmental education training workshops. It is

recommended that CCP staff capitalize on this opportunity to further the development of their crew leaders as efficient environmental educators.

Other opportunities for crew leader training in environmental education exist. For example, SCA currently offers financial reimbursement to offset course costs for crew leaders interested in refreshing wilderness first aid certifications. A similar practice could be applied to crew leaders participating in environmental education training such as *Project Wild* or *Project Wet* workshops. Also, crew leaders have access to a crew leader-specific website. A section of this website could be developed into an environmental education resource centre, whereby both crew leaders and CCP staff could post lesson plans, instructional strategies and other pertinent information pertaining to teaching environmental education within the CCP.

Develop In-Service Learning Resource Materials. The NAAEE also recommends that nonformal environmental education programs incorporate high quality instructional materials and techniques (p.24). In the case of the CCP, it would serve the crew leaders of the CCP well to enter the field with learning resource materials that they could then utilize throughout the duration of the CCP. It is recommended that the CCP develop an environmental education field manual. In-servicing of the field manual would occur during the annual spring meeting.

It is also recommended that the CCP strongly consider both the structure and content of this field manual. In consideration of content, it is recommended that this manual includes: CCP environmental education goals and objectives; key environmental concepts; sample lesson plans; evaluation techniques; suggestions for games, activities and other teaching strategies; and writings pertaining to environmental philosophy and

history (i.e. excerpts from John Muir, Aldo Leopold, Edward Abbey and Rachel Carson, to name but a few). In regards to teaching key environmental concepts, Sue Staniforth and Leesa Fawcett, in their teacher training guidebook *Metamorphosis for Environmental Education* (1994), offer a series of fifty key environmental education concepts that are organized around four components: personal environmental awareness and experience; ecological and natural history connections; culture, nature and reverence; and political and environmental actions (p.22-23). Together, the four components provide a broad overview of key environmental concepts that all CCP crew leaders should be aware of. As the authors note, "the concepts provide the backbone for (a) core course: essentially 'what to teach', and 'why teach' certain activities and skills" (p.24). For example, under the ecological and natural connections component, are the concepts "predation is the consumption of one animal (prey) by another (predator)" (p. 26) and "abiotic parts of the environment include soil, rocks, water, the atmosphere and energy from various sources, including heat, light and gravity" (p.27). It would be of great benefit for the CCP to model a list of recommended ecological concepts after the work of Staniforth and Fawcett.

In consideration of structure, it is also recommended that the CCP ensure that any materials developed are fair and accurate, contain an emphasis on skills building and participatory action, and are designed in a usable format given the field-based nature of the program (NAAEE, 1996, p.4). In regards to the latter, size, durability and binding of any field-based learning resource manual needs to be taken into consideration.

Plan for and Implement Evaluation. A sixth characteristic for developing nonformal environmental education programs recommended by the NAAEE that is

directly relevant to the CCP is planning for and implementing evaluation. As the NAAEE notes, nonformal environmental education programs should include evaluation to ensure accountability and effectiveness (p. 28). In regards to the CCP, it is recommended that evaluation strategies be implemented into all aspects of the program. This includes program planning, for as Hoffman and Thompson (2003) note "the most logical time to build evaluation into your program plan is at the outset of your program, when you are still in the planning stages" (p. 25). If the CCP were to follow the previous recommendations outlined in this research study, namely implementing a more formalized environmental education program within the overarching CCP, it would be wise to plan for evaluation at the beginning of this process.

Currently, the amount of evaluation that the SCA engages in, with regards to environmental education with the CCP, is limited to the distribution of a post-program questionnaire designed to assess a multitude of topics, including crew leader leadership skills, program length and overall program experience. Included within this questionnaire are just three questions pertaining to environmental education. These include "Environmental education was an important and an on-going part of the summer" and "I learned a lot from these (i.e. environmental education) activities" (SCA, 2001). The results of these surveys are limited and difficult to interpret. For example, in 2001 82% of responding participants answered 'strongly agree' or 'agree' to the second statement (Roberts, 2001). But what does this mean? What was 'learned'? What were the activities from which participants claimed learning occurred? Games? Trail work? Guest speakers? What activities were more successful in teaching environmental education, and what activities were less successful or possibly resulted in the students

learning misconceptions about environmental concepts? Is what were 'learned' facts about the specific environment, underlying ecological principles, or environmental action skills? And what does 'a lot' mean? Evaluation methods currently used by the CCP provide limited amounts of data, and it is difficult to draw meaningful conclusions from the data that they have collected.

To this end, it is recommended that SCA staff revisit existing evaluation strategies, introducing methods that will seek to gain both a greater depth and breadth of information. The SCA might want to consider employing a variety of techniques for gathering data including a combination of questionnaires, participant interviews, focus groups, observations, and tests. Evaluation could also take place through participant journaling activities, employing nature art activities (i.e. sketching, photography, etc.) or through successful participation in environmental games or activities. As well, to plan for evaluation, the following stages should be considered: identifying the purpose behind conducting an evaluation; recognizing stakeholders; identifying evaluation questions; developing measures to collect and analyze data; and determining how evaluation data will be disseminated and reported (Hoffman and Thompson, 2003). Finally, in order to truly analyze the impact of the CCP on program participants, it is recommended that the CCP conduct delayed post-program evaluation.

In addition to the above recommendations that parallel the NAAEE guidelines, the following recommendations, as identified by the researcher, are offered forth.

Transferability of Learning and Post-Program Support for Participants. It is recommended that the CCP address the transferability of environmental education learning within the context of the CCP to the home communities of the participants. As reported in the qualitative data, many participants feel that the knowledge and skills that they learned during the CCP had limited relevancy towards preventing or solving future environmental issues outside of the CCP. A greater emphasis on the relevancy of general ecological principles, specific stewardship actions and environmental skills to crewmembers home communities is needed. For example, during the NCNP program many crewmembers reported learning about the flora and fauna of the North Cascades area, yet many also commented on the limited transferability of this learning to their home environments. In order to build on participants' learning experiences, making them more relevant to participants' home communities, NCNP crew leaders could teach participants skills that allow them to generalize their new learning to their home communities. Similarly, participants in the GGNRA2 crew were based camped within a quarter mile of the Pacific Ocean and frequent trips were made to the beach. Sea otters, a formerly endangered species, were reported to inhabit the area. The opportunity existed for GGNRA2 crew leaders to use the sea otter as a basis for teaching larger ecological principles that again could be generalized to participants' home communities. In addition to teaching participants about local fauna such as the sea otters, crew leaders could also use this opportunity to discuss larger ecological processes such as endangered species, predator-prey relationships and food webs, all of which could be generalized to the participants home ecosystems. Possible skills involved in these processes include comparing, observation, field guide use, classification, interpretation, reporting, and

small group work. It is also important that crew leaders share with the participants how these skills can be used in their home communities.

Building on this idea, it is recommended that the SCA implement follow-up strategies designed to further knowledge, attitudes, skills and behaviours learned during the CCP. As Emmons (1994) notes "follow-up activities that allow for continued cycles of growth and action appear to be important...(and should) include additional opportunities for students to develop, implement, and evaluate action strategies" (p.352). Time could be spent during the CCP helping crewmembers identify ways in which they can take action to help prevent or solve environmental problems post-program. Through a combination of website support, list serve networking, and connection to local organizations, crewmembers could continue to receive support from the SCA towards practicing environmentally responsible behaviour.

Implications for Future Research

There are several implications and benefits of this research to both the field of environmental education as well as the SCA and the CCP. As follows are a number of recommendations for future research that would extend the findings of this study.

1. It is widely acknowledged that shifts in attitudes and behaviours are often difficult to measure in the short-term, and that it is often only over the long term that such shifts can be measured. As many crewmembers reported during the interviews that they were not sure if they would use their new knowledge later, it would be of interest to see if respondents did in fact apply or generalize knowledge and skills learned during the CCP to their home environments. It is recommended that the CCP engage in additional

longitudinal research that incorporate post-program research methods such as follow-up interviews designed to measure the long-term impacts, retention, or both of the CCP on participants. This would include measuring and analyzing for the retention of environmental knowledge, attitudes and skills developed by participants during their time with the CCP. Intervals of six months, two and ten years are suggested.

2. It is recommended that research comparing the impacts on participants' environmental knowledge, attitude and skill levels of crew leaders that have been trained in the environmental education goal and objectives of the CCP versus those without training be conducted. By comparing the effects of trained versus non-trained leaders on these domains held by crewmembers, a greater understanding of the importance of crew leader training, as well as the effectiveness, relevancy and transferability of the goal and objectives to the CCP participants could be gained. Currently participation in an annual three-day spring meeting is mandatory for all crew leaders. The opportunity exists that a select number of crew leaders could be involved in-depth training during this gathering. These crew leaders would be subject to comprehensive training that included the goals and objectives of the CCP, key ecological concepts, teaching strategies, and evaluation techniques. As the CCP also has regional offices throughout the United States, an alternative training opportunity exists in that crew leaders could be brought together for regionally specific training at these offices. Through such regional training crew leaders would be given the opportunity to learn more about the specific surrounding environment, and thus incorporate this new knowledge into the environmental education lessons of CCP crewmembers.

3. It is recommended that the SCA consider piloting a CCP crew(s) that is specifically organized around an intensive environmental education curriculum. A substantial number of participants of this research study identified having expectations surrounding increasing environmental knowledge, attitudes and skills entering the CCP. It would be of interest to see if a CCP crew that was marketed with a primary focus on environmental education as opposed to trail building and service learning would draw an increased demand from young adults. This crew would be lead by crew leaders that had been specifically trained in environmental education delivery, nature interpretation, and ecological foundations. During this camp crewmembers would participate in structured lessons organized around an environmental education curriculum. Lessons would be thematically based and would directly relate to the objectives, outcomes and key ecological concepts as identified by the CCP. These lessons would also teach a number of skills (observing, classifying, measuring, communicating, etc.). Key environmental concepts, such as nutrient cycling, succession, predator-prey relationships and energy transfer would be addressed, with opportunities for students to learn generalizations of new learning to their home communities.

4. Greater research into the impacts of longer duration programs (>10 days) on participant levels of environmental knowledge, attitudes and skills would be a valuable addition to the field of environmental education. The amount of current research investigating programs of greater than ten days has been limited (Emmons, 1994; Hanna, 1988; Kellert, 1998). Instead, the majority of research conducted to date appears to be limited to evaluating programs of a shorter duration (<10 days). From the limited research conducted the length of time spent in outdoor education programs appears to

play an important role in the formation of participants' knowledge, attitudes, or behaviours towards the environment (Kellert, 1998). It would be of interest to further investigate the impacts of longer duration programs such as the CCP on the ecological literacy of their participants.

5. It is recommended that various aspects of this research study be replicated with a smaller number of subjects, and a more limited focus (i.e. to just knowledge, attitudes or skills). By bounding the number of subjects, greater in-depth qualitative data could be gathered. In addition, the use of participant journals and observations, two potentially powerful qualitative data collection techniques could be employed. When properly employed and analyzed journals can be an effective means of gathering qualitative data as journaling allow participants to capture thoughts, feelings, and observations while 'in the moment', all which otherwise might be missed during interviews, questionnaires or other forms of data collection.

6. It is recommended that research focusing on the impacts of the CCP on other aspects of ecological literacy be conducted. As both Roth (1968) and McClaren (1989) noted, environmentally literate citizens hold a number of characteristics including environmental sensitivity, facilitation skills, the ability to take action to help the environment, and the ability to think about systems. Research that measures the impacts of the CCP on these other aspects of participants' ecological literacy could include investigating the impacts of the CCP on participant locus of control, environmental sensitivity, or beliefs concerning environmental concepts or specific issues. This additional research might be structured so that an in-depth case study of one CCP crew is

conducted, with the researcher spending an extended period of time immersed in the program alongside the participants.

In Conclusion

There are many implications from this research study. As noted in Chapter One, there is a pressing need to instil in today's young adults the foundations of ecological literacy in order to cultivate a generation of environmentally responsible citizenry. Young adults need to be better prepared to manage the environmental issues they are inheriting. At the same time, the need to teach young people the strategies and skills for preventing future environmental problems exists. In essence, youth must be taught that they are part of the solution, not part of the problem and in order to do so, they need to have the knowledge, skills, motivation, and empowerment to take action. The development of such an ecologically literate citizenry dedicated to practicing environmentally responsible behaviour is critical if we are to address the environmental issues affecting the planet for it is these youth that will be responsible for both preventing new environmental problems as well as implementing solutions to existing problems.

One way in which young adults can learn the underlying elements of ecological literacy is through outdoor service-learning programs. During such programs, exposure to the natural environment, coupled with planned environmental education lessons focused on knowledge acquisition, ecocentric attitude formation, and skills development can greatly assist in the development of an ecologically literate citizenry. Wilderness based service-learning programs offer participants first-hand exposure to the natural environment. Through this exposure participants are afforded the opportunity to develop

sensitivity towards the natural environment, an appreciation and awareness of maintaining environmental integrity, and often a first-hand account of the impacts of human activities on the natural landscape.

The CCP is just such a program, as it holds the potential to play a powerful role in helping shape a future generation of ecologically literate citizens. Through CCP service-learning projects young adults partake in experiences that can advance their environmental knowledge, attitudes, and skills. Indeed, the combination of a CCP's action-based project with first-hand experience within the natural environment is a compelling opportunity in which environmentally responsible behaviour can be fostered.

Currently, environmental education within the CCP is delivered in an ad-hoc manner. While a draft set of environmental education objectives does exist, results from this research study indicate that the draft objectives are not appropriate given the nature of the CCP. These objectives, perhaps more appropriate for a school-based environmental education program, do not adequately reflect the context of the CCP, a backcountry-based service-learning program. The need to revisit these predominantly knowledge-based objectives has been identified. In addition, it has also been indicated that there is the need for the CCP to better connect participants' learning within the program to their lives after the program. It remains critical that the transferability of knowledge, attitudes, and skills learned or formed during the CCP to the participants' home communities be considered, and that crew leaders share with participants how such learning can be generalized to home environments. Proper crew leader training will greatly enhance the success of this occurring, as will the introduction of a more structured environmental education framework. In regards to the latter, as many CCP participants

noted during their interviews that they were not as interested in participating in environmental education activities similar to school-based learning, great care needs to be given as to how further environmental education activities will structured within the CCP.

Overall, the results generated by the current research study provide an important insight into the impacts of the CCP on the knowledge, attitudes, and skills formation of its participants. Given that very little research has been conducted to date on the impacts of the CCP on the ecological literacy domains of crewmembers, any new knowledge can be considered valuable. The SCA has recently made a commitment to focus efforts on enhancing the development, implementation, and evaluation of environmental education in the CCP, and it is anticipated that the results of this research study will greatly contribute to this effort.

In closing, while the need for the CCP to more effectively plan for and deliver environmental education remains, it is important to acknowledge that the CCP does provide participants with a powerful opportunity to learn about natural ecosystems, humankinds impacts on the environment, and stewardship skills. The CCP's combination of long-term immersion in the natural environment coupled with a service-learning project holds great potential towards assisting in the development an environmentally literate citizenry. By revisiting the existing environmental education objectives, enhancing crew leader training, increasing the transferability of environmental education learning, and incorporating a more planned curriculum, the CCP will better meet their overarching environmental education goal, to develop a citizenry that is both environmentally literate and that practices environmentally responsible behaviour.

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APPENDIX A: INTERVIEW QUESTIONS

Introductory Questions

1. Tell me a bit about yourself:
   Prompt: Where do you live? What is your school like? What do you do for fun?

2. Can you tell me why did you decide to participate in the CC Program?

Measuring Student Perception of the Environment

3. What does the word environment mean from your point of view? What does environmental education mean to you?

4. What are environmental issues that concern you the most?
   Prompt: What is it about this issue that makes it a concern for you? How do these problems make you feel?

5. What do you think causes environmental problems in general?
   Prompt: Who might be contributing to environmental problems?

6. Do you feel you have the power to help the environment?
   Prompt: What needs to happen to change the way you feel?

EE and the CC Program - Expectations

7. Did you expect to have your knowledge about the environment increased by participating in this program?
   Prompt: What did you expect to learn?

8. Are you learning as much as you expected to about the environment during this program? If not, what are some aspects you think need more attention in this type of program?

9. Do you think your attitude or feelings about the environment have changed as a result of your participation in this program?
   Prompt: Can you give an example of this?

10. Do you think participating in the program has influenced your behavior towards the environment?
    Prompt: Can you give an example of how your behavior has changed?

11. In what way(s) do you think your future behavior will be affected by your participation in this program?

Environmental Skills

12. What do you consider to be 'skills' that someone might use for preventing or solving environmental problems?

13. Do you feel like you've been learning any new skills through the CC Program that you can use to help the environment when this program is finished?
    Prompt: Can you tell me more about them? What specific new skills have you learned? Can you give me an example of how these skills might enable you to help the environment?

14. Can you think of any new skills you would have liked to of learned?

In Closing

15. Up until this point in the program, what have you learned about the environment that you think will be most useful to you in future?

16. So far, do you think environmental education has been an important part of this program?

17. I'm interested in knowing what your best 'environmental education' moment during the program has been so far. Can you tell me?

18. If there were anything you could change about this program what would it be?

19. Is there anything else that you would like to share with me?

Thank you for your time!

APPENDIX B: LETTER TO PARENTS

May 2002

Dear Parent,

This summer Jennifer Hoffman, a graduate student at the University of Victoria in Canada and past SCA Conservation Crew leader, is conducting research in conjunction with SCA as part of an ongoing effort to learn more about how people can better teach environmental education in outdoor programs. Part of this project involves evaluating the environmental education goal and objectives of the SCA's Conservation Crew Program.

I am writing to inform you that your child is being invited to participate in this study. A large part of the research involves asking Conservation Crew participants to provide us with more information about the effectiveness of SCA's environmental education. If your child elects to participate, we will ask that he or she do the following: fill out questionnaires at the beginning and end of their program; participate in a short interview during their program; and keep a special journal dedicated to his or her thoughts, experiences and opinions on environmental education. All of these different ways of getting information designed to help us learn more about the environmental education knowledge, attitudes and expectations of Conservation Crew Members before and after their involvement in the Conservation Crew Program.

We'd like to stress that your child is under no commitment to participate in this study. It is entirely voluntary. If he or she does participate, he or she will also retain the option of withdrawing at any time, without any penalty. Any information that is shared will be kept confidential. And they will remain anonymous throughout the entire study. There are no known or anticipated risks to your child associated with this study.

During the next few weeks Jennifer will be contacting you by telephone to make sure that your household received this letter and to see if you have any questions. Between now and then, if you have any questions or concerns regarding this study, please do not hesitate to contact Jennifer, either by email (jennhoffman@telus.net) or by phone (250 414-0288).

Sincerely,

Kurt Merrill
Director, Conservation Crew
Director, Risk Management
Student Conservation Association

Jennifer Hoffman
Principal Researcher
University of Victoria

APPENDIX C: INTRODUCTORY LETTER TO PARTICIPANTS

June 2002

Dear SCA Conservation Crew Member,

Hi! My name is Jennifer Hoffman and I am a graduate student at the University of Victoria in Canada. I am also a past SCA Conservation Crew leader. This summer I am doing something that I think is really exciting – I'm conducting research in conjunction with SCA as part of an ongoing effort to learn more about how people can teach environmental education better in outdoor programs. Part of the project involves evaluating the environmental education goals and objectives of SCA's Conservation Crew Program. I will be analyzing various Conservation Crews in Washington, Oregon and California.

I am writing you to see if you will participate in the study. You are being asked to take part in this study because you will be participating in a CC Program this summer, within one of the states listed above. SCA has provided me with your name and address.

A big part of the research involves asking the participant to provide me with more information about the effectiveness of SCA's environmental education. If you participate, I am hoping to obtain information from you in a couple of different ways, including filling out questionnaires at the beginning and end of your program, participating in a short interview with me during your program (I'll be coming to visit your crew), and perhaps even keeping a special journal dedicated to your thoughts, experiences and opinions on environmental education. All of these different ways of getting information are designed to help me learn more about the environmental education knowledge, attitudes and expectations of Conservation Crew Members.

I'd like to stress that you are under no commitment to participate in the study. It is entirely voluntary. If you do participate, you will also have the option of withdrawing at any time, without any penalty. If you withdraw, I will destroy your data. Any personal information you do share with me will be kept confidential. And you'll remain anonymous throughout the entire study. If you choose to participate in the study you'll receive a Consent Form that will tell you more. It is important for you to know that I am in no way in a position of authority or power over you, and that your involvement in this study, and/or the results of your involvement in this study will have no influence on your participation in the Conservation Crew Program.

During the next few weeks I'll be contacting you by telephone to make sure that you received this letter and to see if you have any questions for me. Between now and then, if you or your parents have any questions or concerns, please do not hesitate to contact me. You can reach me by email (jennhoffman@telus.net) or by phone at (250) 414-0288.

I look forward to hopefully meeting you!

Sincerely,

Jennifer Hoffman

APPENDIX D: PRE-TEST QUESTIONNAIRE

June 2002

Pre-Program

Questionnaire

117 Oswego Street
Victoria, BC
Canada V8V 2A9
Phone: (250) 386-5255

Dear SCA Conservation Crew Member,

Hi! My name is Jennifer Hoffman and I am a graduate student at the University of Victoria in Canada. By now I should have spoken with most of you over the phone. During this call I told you what participating in this study means. But just in case I didn't have the chance to talk with you, let me briefly tell a little more about it.

I am conducting educational research, in conjunction with SCA, as part of an ongoing effort to learn more about effective environmental education for backcountry programs. This project involves evaluating the environmental education component of SCA's Conservation Crew Program. Because you are going to be participating in a Conservation Crew Program this summer, you are being asked to participate in this study. Your feedback is important, and will help to improve the program for future crew participants!

Part of the research for this project involves asking you to fill out questionnaires. These questionnaires are designed to help us learn more about the environmental education knowledge, attitudes, opinions and expectations of Conservation Crew Members.

This is the **first** questionnaire. You will receive the **second** questionnaire on the last day of your program. If you have any questions or concerns regarding this, please do not hesitate to contact me. You can reach me at the address below. Also, I will be visiting your program in a few weeks, and you are welcome to ask me questions then as well.

Thank you for taking the time to fill this out!

Sincerely,

Jennifer Hoffman

PRE – PROGRAM QUESTIONNAIRE

How to Complete This Questionnaire

This questionnaire has **SIX** sections. Please read the brief instructions at the start of each section. These instructions will tell you how to answer the questions within each section. Take your time and respond completely and thoughtfully to the questions. It should take you about 45 minutes to complete this questionnaire.

Your Code Number

To gain the most information from my data collection procedure, it is important that we keep each respondent's questionnaires together. In order to help me do this while ensuring your confidentiality, we ask that you provide us with a four-digit number that you will put on each questionnaire that you complete. Please use the day and month of your birthday. For example, if you were born on January 25th, your code number would be 0125 (01 = January, the 1^{st,} month, and 25 = the 25th day).

Please write your code number here: ___ ___ ___ ___

When You Have Finished:

After you have finished your questionnaire, please:

1. Fold it and place it in the envelope marked "My Questionnaire". Seal this envelope.
2. Have one Crew Member (not your Crew Leader) collect all of the sealed envelopes and place them in the large mailing envelope, marked "All Questionnaires". Have one Crew Member seal this envelope.
3. Give the "All Questionnaires" sealed envelope to your Crew Leader, who will return it to us.

Thank you for your time!

Part I: Crew Member Information

The purpose of this section is to learn a little about your background. Please **CHECK** the appropriate box. Check only ONE box. This information will remain strictly confidential.

1. What is your gender?
   ☐ Male ☐ Female

2. What is your age?
   ☐ 15 ☐ 16 ☐ 17 ☐ 18 ☐ 19

3. What grade did you last complete?
   ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

4. This is your:
   ☐ 1st SCA program
   ☐ 2nd SCA program
   ☐ 3rd SCA program
   ☐ 4th or more (how many programs have you done) _____

5. In what type of surroundings have you been raised most of your life?
   ☐ Rural/Agricultural
   ☐ Small town
   ☐ Suburbs
   ☐ Large Urban City
   ☐ Other (Describe) _____

Part Two: Past Experience

In addition to your personal background, your past experiences may help explain your present interests and tendencies.

For Questions #1 To #5 CHECK (✓) the Correct Answer

1. How many visits to wilderness areas (e.g., national/state parks, nature sanctuaries, national forests, etc.) do you remember making during your life? If you cannot remember, make an educated guess.

- ☐ 30 or more
- ☐ 15 to 29 visits
- ☐ 10 to 14 visits
- ☐ 6 to 9 visits
- ☐ 1 to 4 visits
- ☐ 0 visits

2. How many visits to local natural areas (e.g., local park, creek, seashore, forest/wooded area) do you remember making during your life?

- ☐ 30 or more
- ☐ 15 to 29 visits
- ☐ 10 to 14 visits
- ☐ 6 to 9 visits
- ☐ 1 to 4 visits
- ☐ 0 visits

3. Prior to this program what is the longest you have ever gone camping in a tent (not including in a motor home or RV)?

- ☐ 29 days or more
- ☐ 21 to 28 days
- ☐ 14 to 20
- ☐ 7 to 13 days
- ☐ 1 to 6 days
- ☐ I have never been tent camping before

4. Other than this one, in how many non-school programs that involve the environment or out-of-doors have you participated? (Outward Bound, 4-H, Scouts/Guides, Youth Conservation Corps, YMCA – YWCA, church camps, etc.)

- ☐ 6 or more
- ☐ 4 or 5
- ☐ 2 or 3
- ☐ 1
- ☐ None

5. In how many environmental groups, clubs or organizations have you participated or been a member of? (e.g. the Sierra Club, Audubon Society, school environmental club, etc.)?

- ☐ 6 or more
- ☐ 4 or 5
- ☐ 2 or 3
- ☐ 1
- ☐ None

Past Experiences Continued

For Question #6 CHECK (✓) the Correct Answer

Source	Very Often	Often	Occasionally	Rarely	Never
Friends					
Schools/Teachers					
TV					
Clubs					
Books/Magazines/Newspapers					
Internet					
Other (What): _____					

For Question #7 CIRCLE the Correct Answer

7. For **EACH** grade, **CIRCLE** the number of subjects you have taken at school that have focused in part, or in whole, on learning about the environment and/or environmental issues? (Examples of subjects are: Biology, Botany, Geography, Geology, Ecology, Environmental Education/ Sciences, Outdoor Pursuits/ Recreation Leadership, etc.) List the names of the subjects. **NA means Not Applicable; you haven't yet completed that grade.**

Grade	Number of Subjects							Name of Subject
Grade 7	0	1	2	3	4	5	NA	_____
Grade 8	0	1	2	3	4	5	NA	_____
Grade 9	0	1	2	3	4	5	NA	_____
Grade 10	0	1	2	3	4	5	NA	_____
Grade 11	0	1	2	3	4	5	NA	_____
Grade 12	0	1	2	3	4	5	NA	_____

For Question #8 CHECK (✓) All That Apply

8. Which of the following activities have you ever participated in?

- ☐ I have written a letter to a government official or the media about the environment.
- ☐ I have raised money for environmental projects.
- ☐ I have participated in an environmental project or event with an organization concerned with the environment
- ☐ I avoid using or buying certain products because of their environmental impacts.
- ☐ I try to consume less in order to minimize my impact on the environment.
- ☐ I recycle products at home or at school.
- ☐ I read books about the environment for fun.
- ☐ I attend meetings at school or in the community about the environment.
- ☐ Other activities that I do for the environment are:

_____

Part Three: Environmental Knowledge

This section of the survey is designed to determine environmental knowledge. **CIRCLE** the letter that reflects what you think is a correct response to the statement or question. Remember, this is not a test! Do not worry if you cannot answer many of these questions. Very few people can.

1. The most stable natural communities are those with the greatest _____.
   (a) variety of plants and animals.
   (b) number of acres.
   (c) number of small organisms.
   (d) number of rivers and streams.

2. Living plants:
   (a) put more nutrients in the soil.
   (b) move nutrients through the soil.
   (c) replace the nutrients in the soil with other nutrients.
   (d) take nutrients out of the soil.

3. As energy flows from the sun to plants and then to animals:
   (a) the amount of energy remains the same.
   (b) most of the energy is lost.
   (c) the amount of energy doubles.
   (d) half of the energy is transformed to heat energy.

4. A food web is:
   (a) a single sequence of organisms through which energy passes
   (b) is a network of food chains
   (c) is always started with one or more green plants
   (d) inevitably ends with human consumers

5. Following a forest fire or clearcutting, most forest land typically passes through successional changes in a certain order. Which is the first type of plant to revegetate the land?
   (a) shade intolerant herbaceous species (small plants).
   (b) lichen.
   (c) shade intolerant tree species.
   (d) shade tolerant tree species.

6. Where does most of the garbage go after it is dumped from the garbage trucks?
   (a) to an aquifer where it is buried (an aquifer is a water-bearing underground layer of earth, gravel, or stone)
   (b) it is dumped into the ocean.
   (c) it is recycled to make plastic.
   (d) to a landfill where it is buried.

7. Erosion can result from which of the following:

   (a) clearcutting forests on steep slopes.
   (b) road building along the ridges of steep hills and mountains.
   (c) overgrazing by cattle and sheep.
   (d) all of the above.

Environmental Knowledge continued

8. Which of the following can regulate the population size of a species?

(a) predators.
(b) diseases.
(c) environmental changes
(d) all of the above

9. The part of the soil that acts as a sponge to hold water in place is the:

(a) inorganic matter.
(b) mineral matter.
(c) organic matter.
(d) sedimentary matter.

10. The ecological role of a fungus is:

(a) decomposition and release of nutrients back into the environment.
(b) warning that an ecosystem is being degraded.
(c) replenishing aquifers (aquifers are water-bearing underground layer of earth, gravel, or stone).
(d) photosynthesizing food for other organisms.

11. The two major factors responsible for biomes (areas on the earth with similar climate, plants, and animals) are precipitation and _____.

(a) topography
(b) temperature
(c) weather
(d) humidity

12. Earth's total water supply is _____.

(a) 86.2% ocean
(b) 89.4% ocean
(c) 94.6% ocean
(d) 97.2% ocean

13. Formation of 1 inch of topsoil takes an average of _____.

(a) 100 – 200 years
(b) 200 – 400 years
(c) 400 – 600 years
(d) 600 – 800 years

14. An organism that feeds on both plants and animals is a _____?

(a) omnivore
(b) herbivore
(c) carnivore
(d) producer

15. An example of a thin, high-level cloud (found at heights greater than 20,000 feet) is:

(a) altocumulus
(b) cirrus
(c) nimbostratus
(d) cumulus

Part Four: Environmental Attitude

This section of the survey is designed to determine environmental attitudes. There are no right or wrong answers, only differences of opinion. **CIRCLE** the letter that reflects your true feelings.

A = Strongly Agree; B = Agree; C = Neutral ; D = Disagree; E = Strongly Disagree

1. All forest fires should be actively and immediately suppressed.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. Marshlands and estuaries (a water passage where the tide meets a river current) should be filled to make land for housing.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. Wilderness users should be required to pass a test demonstrating their knowledge of appropriate low impact camping techniques prior to being granted a wilderness permit.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. Individuals should be allowed to use private land for any purpose.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. People should be allowed to do both non-motorized (e.g. hiking, cross-country skiing, etc.) and motorized (e.g. off road vehicles, etc.) recreation activities in wilderness areas.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. Special habitats should be set aside for endangered species.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7. Laws regarding water quality should be stricter.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

8. I am not in favor of saving remote wilderness that most people will rarely have the chance to see.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

9. Poisonous snakes that pose a threat to people should be killed.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

10. I think we need to develop oil resources in places like the Arctic National Wildlife Refuge.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Environmental Attitude continued

11. It is important that each individual be aware of environmental concerns.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

12. Hunting and fishing are important environmental management activities.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

13. Hiking in wilderness areas should be restricted to designated travel routes (i.e. trails).

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

14. Government should regulate the use of land to protect wildlife habitat.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

15. Due to the ecological and social impact of large groups, the party size of wilderness travel groups should be limited.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

16. All plants and animals play an important role in the environment.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

17. Government should pass laws to make recycling mandatory.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

18. People shouldn't try to manage wildlife populations; it should be left up to nature.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

19. Preserving wild areas for scientific study is far less important today because we know so much more about how nature works.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

20. Industries should be held financially responsible for any pollution they cause.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Part Five: Environmental Opinions

This section of the survey is designed to measure your opinion about different environmental problems. Please indicate how seriously you regard the following environmental problems in the United States today. **CIRCLE** the letter that reflects your true feelings.

A = Very Serious; B = Somewhat Serious; C = Not Very Serious; D = Not At All Serious; E = No Opinion

1. Loss of large wilderness areas.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

2. Increasing human population on the planet.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

3. Water pollution.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

4. Species endangerment and extinction.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

5. Overuse of national parks.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

6. Excessive litter and garbage in the environment.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

7. Air pollution.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

8. Destruction of plant and animal habitats.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

9. Loss of biological diversity.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

10. Declining quality of the urban environment.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

Part Six: Expectations

I am interested in learning more about your expectations about the types and amounts of environmental education that you think you might receive during your program. **CIRCLE** the letter that you most agree with.

A = Strongly Agree; B = Agree; C = Neutral; D = Disagree; E = Strongly Disagree

1. I expect that an important part of this program will be improving my knowledge of ecology.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. I expect that I will learn new skills to work towards the solution of environmental problems (for example, species extinction).

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. Learning new skills to prevent environmental problems will be an important part of this program.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. After participating in the CC Program, I expect to be more motivated towards solving environmental problems.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. Because of this program, I expect that I will gain a greater appreciation for nature.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Last Question!

Do you think environmental education should be an important part of the Conservation Crew program?

- ☐ Yes
- ☐ No
- ☐ Don't Know/Unsure

In the space below, please explain your answer.

_____

_____

_____

You are finished! Thank you for your participation.

APPENDIX E: POST-TEST QUESTIONNAIRE

July 2002

Post-Program

Questionnaire

Jennifer Hoffman
117 Oswego Street
Victoria, BC
Canada V8V 2A9
Phone: (250) 386-5255
Email: jennhoffman@telus.net

Dear SCA Conservation Crew Member,

Hi! My name is Jennifer Hoffman and I am a graduate student at the University of Victoria in Canada. As you might remember I am, along with the Student Conservation Association, conducting educational research as part of an ongoing effort to learn more about effective environmental education for backcountry programs. This project involves evaluating the environmental education component of the Student Conservation Association's Conservation Crew Program.

By now, you should have completed **ONE** questionnaire for this project. This is the **SECOND**. It is similar to the first, but it also has a few new questions you haven't seen before.

If you have any questions or concerns regarding this, please do not hesitate to contact me. You can reach me at the address below.

Again, thank you for taking the time to fill this out!

Sincerely,

Jennifer Hoffman

POST – PROGRAM QUESTIONNAIRE

How to Complete This Questionnaire

This questionnaire has **SEVEN** sections. Please read the brief instructions at the start of each section. These instructions will tell you how to answer the questions within each section. Take your time and respond completely and thoughtfully to the questions. It should take you about 45 minutes to complete this questionnaire.

Your Code Number

To gain the most information from my data collection procedure, it is important that we keep each respondent's questionnaires together. In order to help me do this while ensuring your confidentiality, we ask that you provide us with a four-digit number that you will put on each questionnaire that you complete. Please use the day and month of your birthday. For example, if you were born on October 25th, your code number would be 1025 (10 = October, the 10th month, and 25 = the 25th day).

Please write your code number here: ___ ___ ___ ___

THIS SHOULD BE THE SAME NUMBER YOU USED ON THE FIRST QUESTIONNAIRE.

When You Have Finished:

After you have finished your questionnaire, please:

4. Fold it and place it in the envelope marked "My Questionnaire". Seal this envelope.
5. Have one Crew Member (not your Crew Leader) collect all of the sealed envelopes and place them in the large mailing envelope, marked "All Questionnaires". Have one Crew Member seal this envelope.
6. Give the "All Questionnaires" sealed envelope to your Crew Leader, who will return it to me.

Thank you for your time!

Part One: Environmental Knowledge

This section of the survey is designed to determine environmental knowledge. **CIRCLE** the letter that reflects what you think is a correct response to the statement or question. Remember, this is not a test! Do not worry if you cannot answer many of these questions. Very few people can.

1. The most stable natural communities are those with the greatest _____.
   (a) variety of plants and animals.
   (b) number of acres.
   (c) number of small organisms.
   (d) number of rivers and streams.

2. Living plants:
   (a) put more nutrients in the soil.
   (b) move nutrients through the soil.
   (c) replace the nutrients in the soil with other nutrients.
   (d) take nutrients out of the soil.

3. As energy flows from the sun to plants and then to animals:
   (a) the amount of energy remains the same.
   (b) most of the energy is lost.
   (c) the amount of energy doubles.
   (d) half of the energy is transformed to heat energy.

4. A food web is:
   (a) a single sequence of organisms through which energy passes
   (b) is a network of food chains
   (c) is always started with one or more green plants
   (d) inevitably ends with human consumers

5. Following a forest fire or clearcutting, most forest land typically passes through successional changes in a certain order. Which is the first type of plant to revegetate the land?
   (a) shade intolerant herbaceous species (small plants).
   (b) lichen.
   (c) shade intolerant tree species.
   (d) shade tolerant tree species.

6. Where does most of the garbage go after it is dumped from the garbage trucks?
   (a) to an aquifer where it is buried (an aquifer is a water-bearing underground layer of earth, gravel, or stone)
   (b) it is dumped into the ocean.
   (c) it is recycled to make plastic.
   (d) to a landfill where it is buried.

7. Erosion can result from which of the following:
   (a) clearcutting forests on steep slopes.
   (b) road building along the ridges of steep hills and mountains.
   (c) overgrazing by cattle and sheep.
   (d) all of the above.

Environmental Knowledge continued

8. Which of the following can regulate the population size of a species?

(a) predators.
(b) diseases.
(c) environmental changes
(d) all of the above

9. The part of the soil that acts as a sponge to hold water in place is the:

(a) inorganic matter.
(b) mineral matter.
(c) organic matter.
(d) sedimentary matter.

10. The ecological role of a fungus is:

(a) decomposition and release of nutrients back into the environment.
(b) warning that an ecosystem is being degraded.
(c) replenishing aquifers (aquifers are water-bearing underground layer of earth, gravel, or stone).
(d) photosynthesizing food for other organisms.

11. The two major factors responsible for biomes (areas on the earth with similar climate, plants, and animals) are precipitation and _____.

(a) topography
(b) temperature
(c) weather
(d) humidity

12. Earth's total water supply is _____.

(a) 86.2% ocean
(b) 89.4% ocean
(c) 94.6% ocean
(d) 97.2% ocean

13. Formation of 1 inch of topsoil takes an average of _____.

(a) 100 – 200 years
(b) 200 – 400 years
(c) 400 – 600 years
(d) 600 – 800 years

14. An organism that feeds on both plants and animals is a _____?

(a) omnivore
(b) herbivore
(c) carnivore
(d) producer

15. An example of a thin, high-level cloud (found at heights greater than 20,000 feet) is:

(a) altocumulus
(b) cirrus
(c) nimbostratus
(d) cumulus

Part Two: Environmental Attitude

This section of the survey is designed to determine environmental attitudes. There are no right or wrong answers, only differences of opinion. **CIRCLE** the letter that reflects your true feelings.

A = Strongly Agree; B = Agree; C = Neutral ; D = Disagree; E = Strongly Disagree

1. All forest fires should be actively and immediately suppressed.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. Marshlands and estuaries (a water passage where the tide meets a river current) should be filled to make land for housing.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. Wilderness users should be required to pass a test demonstrating their knowledge of appropriate low impact camping techniques prior to being granted a wilderness permit.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. Individuals should be allowed to use private land for any purpose.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. People should be allowed to do both non-motorized (e.g. hiking, cross-country skiing, etc.) and motorized (e.g. off road vehicles, etc.) recreation activities in wilderness areas.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. Special habitats should be set aside for endangered species.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7. Laws regarding water quality should be stricter.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

8. I am not in favour of saving remote wilderness that most people will rarely have the chance to see.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

9. Poisonous snakes that pose a threat to people should be killed.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

10. I think we need to develop oil resources in places like the Arctic National Wildlife Refuge.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Environmental Attitude continued

11. It is important that each individual be aware of environmental concerns.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

12. Hunting and fishing are important environmental management activities.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

13. Hiking in wilderness areas should be restricted to designated travel routes (i.e. trails).

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

14. Government should regulate the use of land to protect wildlife habitat.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

15. Due to the ecological and social impact of large groups, the party size of wilderness travel groups should be limited.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

16. All plants and animals play an important role in the environment.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

17. Government should pass laws to make recycling mandatory.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

18. People shouldn't try to manage wildlife populations; it should be left up to nature.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

19. Preserving wild areas for scientific study is far less important today because we know so much more about how nature works.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

20. Industries should be held financially responsible for any pollution they cause.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Part Three: Environmental Opinions

This section of the survey is designed to measure your opinion about different environmental problems. Please indicate how seriously you regard the following environmental problems in the United States today. **CIRCLE** the letter that reflects your true feelings.

A = Very Serious; B = Somewhat Serious; C = Not Very Serious; D = Not At All Serious; E = No Opinion

1. Loss of large wilderness areas.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

2. Increasing human population on the planet.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

3. Water pollution.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

4. Species endangerment and extinction.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

5. Overuse of national parks.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

6. Excessive litter and garbage in the environment.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

7. Air pollution.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

8. Destruction of plant and animal habitats.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

9. Loss of biological diversity.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

10. Declining quality of the urban environment.

A	B	C	D	E
Very Serious	Somewhat Serious	Not Very Serious	Not Serious At All	No Opinion

Part Four: Student Assessment of Knowledge

Please indicate how much you think your program has increased your knowledge of the natural environment in the areas listed below. **CIRCLE** one letter for each area.

A = Very Much; B = Moderately; C = A Little; D = Not At All; E = No Opinion

1. General awareness of the natural environment.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

2. Ability to identify various plants and animals.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

3. Knowledge of geology and geography.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

4. Knowledge of ecology.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

5. Knowledge of human impacts on the environment.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

6. Knowledge of conservation.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

7. Knowledge of wildlife.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

8. Knowledge of botany (the study of plant life).

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

9. Knowledge of hydrology (the study of water distribution, health and role in life on earth)

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

10. Knowledge of weather and climate.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

Student Assessment of Knowledge continued

11. Knowledge of government agencies that administer laws concerning the natural environment.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

12. Knowledge of interest groups concerned with the environment.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

13. Knowledge of past and present land use.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

14. Knowledge of environmental justice issues and problems.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

15. Knowledge of my ability to help the environment.

A	B	C	D	E
Very Much	Moderately	A Little	Not At All	No Opinion

Part Five: Environmental Skills

I am interested in learning if the CC Program taught you any new skills for minimizing your impact the environment, or for helping the environment. **CIRCLE** the letter that you most agree with.

A = Strongly Agree; B = Agree; C = Neutral; D = Disagree; E = Strongly Disagree

1. As a result of participating in the CC Program I can identify and apply Leave No Trace Principles to my outdoor experiences.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. Participating in the CC Program has taught me how to work as part of a team to help prevent environmental problems.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. As a result of participating in the CC Program I now feel confident I can use a stove to cook meals in the backcountry.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. Through participating in the CC Program I have developed new skills for restoring environmentally degraded (damaged) areas.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. The CC Program has taught me to travel safely and lightly in the environment.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. By participating in the CC Program I have improved my ability to use a compass and a map.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Part Six: Student Assessment of Attitude Change

I am interested in learning more about how participating in this program changed your attitudes as they relate to the environment. **CIRCLE** the letter that you most agree with.

A = Strongly Agree; B = Agree; C = Neutral; D = Disagree; E = Strongly Disagree

1. During this program I improved my overall knowledge of ecology.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. Because of this program, I feel more responsible for conserving and protecting nature.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. By participating in this program I have learned new skills for preventing environmental problems.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. By participating in this program I have learned new skills for solving environmental problems.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. Because of this program, I am now more motivated to work towards solving environmental problems.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. Because of this program, I have a greater appreciation for nature.

A	B	C	D	E
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Part Seven: Your Feedback

Please take a minute to fill out the questions below.

1. Overall, do you think environmental education was an important part of this program?

- ☐ Yes
- ☐ No
- ☐ Don't Know/Unsure

In the space below, please explain your answer.

_____
_____
_____
_____

2. Do you think participating in this program made you significantly more aware of the environment?

- ☐ Yes
- ☐ No
- ☐ Don't Know/Unsure

In the space below, please explain your answer.

_____
_____
_____

3. Do you think this program had any major effect on your feeling of responsibility towards caring for the environment?

- ☐ Yes
- ☐ No
- ☐ Don't Know/Unsure

In the space below, please explain your answer.

_____
_____
_____

4. During the program, what is the most memorable experience you had learning about the environment? Please explain what it is, why it was important, and how you learned it (for example, through a game, a talk, a hike, etc.):

_____
_____
_____

You are finished! Thank you for your participation.

APPENDIX F: CONSENT FORM

You are being invited to participate in a study entitled *Evaluating the Environmental Education Goals and Objectives of a Service-Based Conservation Organization* that is being conducted by myself, Jennifer Hoffman, in conjunction with the Student Conservation Association.. I am a graduate student in the Department of Curriculum and Instruction at the University of Victoria and you may contact me if you have further questions by phone (250-414-0288), email (jennhoffman@telus.net) or mail (Jennifer Hoffman, 117 Oswego Street, Victoria, BC, Canada.

As a graduate student, I am required to conduct research as part of the requirements for a degree in Science Education within the Department of Curriculum and Instruction. It is being conducted under the supervision of Gloria Snively. You may contact Dr. Snively at (250) 721-7764 if you have questions.

The purpose of this research project is learn how effectively outdoor organizations, such as the Student Conservation Association (SCA), teach environmental education to participants. Research of this type is important because every year many youths participate in programs that are focused in some way on the environment. This includes SCA's Conservation Crew (CC) program. Many of these youth bring certain expectations about what they will learn about the environment to these programs. Similarly, the organizations that offer these programs often have specific ideas about both what environmental education is and what students should learn. By analyzing the needs and wants of both the youth and the organization, we can better learn effective ways in which to develop and teach environmental education materials.

SCA has provided me with the names and addresses of students participating in CC programs greater than 30 days in length, in programs within Washington, Oregon, and California. This is how I obtained your contact information. You have been selected to take part in this study because you will be participating in a CC Program this summer, within one of the states listed above. Programs that run in these areas will receive field visits from me. You are being asked to participate in this study because SCA has recently developed a set of goals and objectives for environmental education that has never been tested in a research context. I will be testing these goals and objectives to see how well they match the CC Program's activities. This research is supported and encouraged by SCA staff, who are also hoping to learn how effective their environmental education goals and objectives are.

If you agree to voluntarily participate in this research, your participation will include filling out questionnaires on the first and last days of your program. Some of you may also receive questionnaires a few months after the program is over. In addition, I will be visiting your crew during your program, where I may ask if I can interview you. If I do interview you, I will contact you through a brief telephone call a few months after the program is over, to make sure the information that I collected during our interview is correct. During my visits, I will also be taking field notes, in order to record any environmental education-related activities that might occur. Finally, some crew members will have the option of keeping a special Environmental Education journal. The journal is so that you can record your thoughts and observations on the environment during your time with the Conservation Crew Program. The journal is entirely optional.

Participation in this study may cause some inconvenience to you. I anticipate the major inconvenience of this study will be taking some of your time at the beginning and end of the program to fill out the questionnaires (about 45 minutes), as well as taking some of your time

during the program to participate in the interview (about an hour). Writing in the journal may also take up some of your time.

There are no known or anticipated risks to you by participating in this research. There are potential benefits of your participating in this research. You will have the opportunity to learn more about what environmental education is all about. As well, you will have the chance to share your voice with SCA as to what you think is important to learn and what you expect to learn during the CC Program. Future CC Members will benefit from this research in that they will participate in programs that utilized improved environmental education curriculum.
Your input is important!

Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study your data will be destroyed.

To make sure that you continue to consent to participate in this research, I will remind you again about consent, verbally before the interviews, and in writing on the last day and post-program questionnaires. At any time you can choose to withdraw from the study.

It is important for you to know that I am in no way in a position of authority or power over you, and that your involvement in this study, and/or the results of your involvement in this study will have no influence on your participation in the Conservation Crew Program.

During the research, you will remain anonymous. I will ask you to give a code number to the questionnaires so that later on, when I am analyzing the data, I will be able to match questionnaires up. This same code number will be given to your interview and journal notes. I will not share your name, initials or any other identifying information with anyone else, including SCA, at any time.

Your confidentiality and the confidentiality of the data will be also be protected. Any personal information that you share with me will not be shared with others without your consent. During your interviews I will use a tape recorder to gather data. Later on, these tapes will be typed out and stored on my computer, along with the data from the questionnaires. No one other than myself will have access to your data at any time. Six months after this study is finished, I will destroy all of the data by erasing my computer files and shredding the returned questionnaires, journals and any field notes that I have taken. It is anticipated that the results of this study will be shared with others through the writing, defense and publication of my thesis.

In addition to being able to contact the researcher at the above phone numbers, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President, Research at the University of Victoria (250-472-4362).

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

_____	_____	_____
Name of Participant	*Signature*	*Date*

A copy of this consent will be left with you, and a copy will be taken by the researcher.

APPENDIX G: JOURNAL QUESTIONS

Questions of the Week

WEEK ONE:

"A mind that is stretched by a new experience can never go back to its old dimensions."
Oliver Wendell Holmes

For your first journal entry, describe what you think environmental education really means. Try to describe it as much as you can! Next, do you think learning about the environment is important? Why or why not? How do you expect to learn about the environment during this program (if you do at all!)?

WEEK TWO:

"When we try to pick out anything by itself, we find it hitched to everything else in the universe".
John Muir

Some people say John Muir was America's most famous and influential naturalist and conservationist. He was also a great wilderness explorer and journal-keeper! First, read his quote (above). Next, think about connections: What connections do you see in the environment around you? Can you think of some 'big' or global connections? How about some small scale or 'micro' connections? Try to describe at least one natural set of connections in the environment around you, and the importance of this connection. What do you think would happen if this connection were destroyed?

WEEK THREE:

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."
Aldo Leopold.

Consider the area you are working in. List some of the environmental issues or problems affecting it. Try to choose one issue or problem. How do you think this issue or problem can be solved? Is it easy to solve, or are different people's opinions, values or interests in conflict? What is your personal opinion of the situation?
What is a commodity?

WEEK FOUR:

"The only way to achieve lasting change is from the bottom up: through the actions of everyday people."
www.adbusters.org

Do you think that your experience with this SCA Program has empowered (define?) you to work more towards caring for the environment? Why or why not? If yes, what skills or information have you learned that most motivates you? What do you think you will do?

WEEK FIVE:

"Be the change you wish to see".
Gandhi

For your last journal entry, once again describe what <u>you think</u> environmental education really means. Has your impression of what learning about the environment means changed during your time with the SCA Program? Has your participation increase your knowledge of the environment? Can you give an example? And finally, what is the most important thing you learned about the environment during this program?
This might be a difficult question.

APPENDIX H:
NONFORMAL ENVIRONMENTAL EDUCATION PROGRAMS:

GUIDELINES FOR EXCELLENCE

Source: North America Association for Environmental Education (NAAEE). (2004). *Nonformal Environmental Education Programs: Guidelines for Excellence.* Washington, DC: NAAEE, page 11.

GUIDELINES AT A GLANCE

Key Characteristic #1: Needs Assessment. Nonformal environmental education programs are designed to address identified environmental, educational, and community needs and to produce responsive, responsible benefits that address those identified needs.

1.1 Environmental issue or condition
1.2 Inventory of existing programs and materials
1.3 Audience needs

Key Characteristic #2: Organizational Needs and Capacities. Nonformal environmental education programs support and complement their parent organization's mission, purpose, and goals.

2.1 Consistent with organizational priorities
2.2 Organization's need for the program identified
2.3 Organization's existing resources inventoried

Key Characteristic #3: Program Scope and Structure. Nonformal environmental education programs should be designed with well-articulated goals and objectives that state how the program will contribute to the development of environmental literacy.

3.1 Goals and objectives for the program
3.2 Fit with goals and objectives of environmental education
3.3 Program format and delivery
3.4 Partnerships and collaboration

Key Characteristic #4: Program Delivery Resources. Nonformal environmental education programs need to ensure that well trained staff, facilities, and support materials are available to accomplish program goals and objectives.

4.1 Assessment of resource needs
4.2 Quality instructional staff
4.3 Facilities management
4.4 Provision of support materials
4.5 Emergency planning

Key Characteristic #5: Program Quality and Appropriateness. Nonformal environmental education programs are built on a foundation of quality instructional materials and thorough planning.
5.1 Quality instructional materials and techniques
5.2 Field testing
5.3 Promotion, marketing, and dissemination
5.4 Sustainability

Key Characteristic #6: Evaluation. Nonformal environmental education programs define and measure outcomes in order to improve current programs, ensure accountability, and maximize the effects of future efforts.
6.1 Determination of evaluation strategies
6.2 Effective evaluation techniques and criteria
6.3 Use of evaluation results