Restoring Nature Literacy: Developing a Nature-Based Afterschool Program to Restore Connection Between Children and their Local Natural Environment

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Figure 1. David Cameron Elementary School, Colwood BC

"*If the connection between nature and the current generation of young people continues to fade, where will future stewards of the earth come from*?" (Louv, 2008)

Abstract

Children are spending significantly less time outdoors compared to children of previous generations. Increase use of technology, lack of nearby natural areas, and concerns for risk and safety have all contributed to a generation of children spending much of their time indoors. As a result, a *disconnection* between children and nature has occurred. Research suggests benefits of spending time in nature include increased physical activity, reduced stress, and development of a fondness for nature. The purpose of my project was to develop an experiential nature-based afterschool program for school-aged children. My hope was to restore fading ecological knowledge by reconnecting children with their local natural environment through a series of outdoor physical and social activities. Feedback at the end of the project suggested children acquired new ecological knowledge and skills while enjoying their time spent in nature. Success of project could be used to inform future nature-based after school programs.

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1.0 Introduction

Research suggests children are spending significantly less time playing outdoors compared to previous generations (Ceciliani & Bortolotti, 2013; Day & Wager, 2010; Staempfli, 2009). Consequences of globalization and urban growth have diminished opportunities for playing outdoors (Bento & Dias, 2017). Several barriers preventing children from engaging in outdoor play, particularly in urban settings, include greater use of technology, concerns about risk and safety, and access to nearby natural areas (Brussoni, Olsen & Pike, 2012). Although not considered a medical diagnosis, the notion of a 'nature-deficit disorder,' and a growing body of supporting research, indicates the disconnect between children and nature is related to many physical and social–emotional vulnerabilities in early childhood (Charles, 2009; Louv, 2008). In addition to the behavioural problems associated with 'nature-deficit disorder,' Louv (2008) also describes a lack of ecological knowledge and environmental stewardship due to the growing disconnect between children and nature. According to Sobel (1996), "children are disconnected from the world outside their doors while being taught about endangered animals and ecosystems through electronic media and at school."

In contrast, a wealth of research exists pointing to myriad benefits outdoor play provides. According to Lim, Donovan, Harper, and Naylor (2017), active play outdoors, with its inherent risks, is essential for healthy child development. Outdoor play affords children opportunities to engage in 'richer imaginative play; increased physical activity; calmer, more focused play; and positive social interaction' (Nedovic & Morissey, 2013). Research also suggests the development of environmental awareness and stewardship is developed through childhood experiences in nature (White, 2004). Regular positive interactions within nature help children develop respect and a caring attitude for the environment (Cohen 1992; Wilson 1997).

For years, humans have contributed to global damage and destruction of the natural world. Human-caused ecosystem degradation and habitat loss remains a significant threat to endangered plants and animals worldwide (Adebayo, 2019). When we consider humans as part of the great cycle of life on earth, we realize the health and function of natural systems influences that of our own (Hancock et. al., 2016). In terms of ecosystem health, the *Society for Ecological Restoration* defines the practice of ecological restoration as an "intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability." (SER, 2004). The practice of ecological restoration initiates or accelerates recovery of an

ecosystem with respect to its structure, function, and sustainability (Council, 2008). According to Trevor Hancock (2011), policies and initiatives aimed at protecting and restoring the health of local ecosystems are needed to restore human health. In order to accomplish a human cultural shift, Hancock (2011) believes nature education, and the positive health benefits associated with nature immersion, is vital in its inclusion within school curriculum.

In their paper, *Educational restoration: a foundational model inspired by ecological restoration*, Kensler and Uline (2019) advocate for a shift in the education model - from a factory model to a living systems model. According to Kensler and Uline, "just as ecologists must deeply understand the healthy version of the system they aim to restore, so must educators deeply understand healthy learning systems." In accordance with *Ecological Restoration for Protected Areas: principles, guidelines and best practices*, this nature-based educational program seamlessly aligns itself with several principles and guidelines underlying ecological restoration in protected areas (Keenleyside et al., 2012). Education is critical in promoting and supporting environmental sustainability by creating an environmentally literate society (Leeming, Dwyer, & Bracken, 1995).

The premise of this paper is to describe the development and implementation of a nature-based educational program at a local elementary school. The intention of the program is to provide opportunities for being physically and socially active, outdoors, while fostering the development of nature literacy among school-aged children. As a student in the Restoration of Natural Systems (RNS) program, at the University of Victoria, I have experienced my own reconnection with the natural world. Memorable RNS projects I completed include a biophysical inventory of a local park and nearby creek, as well as the development of a restoration prescription for an urban ravine. These sensory-rich experiential learning opportunities inspired me to want to share these experiences with younger generations. By restoring the health of our local ecosystems, we restore ourselves by developing our nature literacy.

2. Study Area & Project Details

2.1 History of David Cameron Elementary School - School and Site

School History

David Cameron Elementary School officially opened on January 26, 1972. The school is located in Colwood, British Columbia and is part of the Sooke School District (School District 62). Originally to be named Colwood Lake Elementary, the school was eventually named after David Cameron, the first Chief Justice of Vancouver Island (from 1853-1865). David Cameron Elementary School is an important part of the West Shore community of Greater Victoria Region and serves a population of about 313 students in kindergarten to grade 5 (David Cameron Elementary, 2019).

Figure 2. Satellite View of David Cameron Elementary School and surrounding residential area - Colwood, BC

Site History

Over 300 watersheds comprise the capital regional district of Greater Victoria, including natural and urban influenced drainage areas, that flow toward the harbours and shorelines (CRD Map, 2019). David Cameron Elementary School lies within the Colwood Creek Watershed. The Colwood Creek Watershed (Figure 3) is located west of Victoria and consists of residential and recreational areas, forests, lakes, wetlands and creeks (CRD Map, 2019). The flow of rainwater runs from Colwood Creek to Esquimalt Lagoon. Developed commercial and residential areas of Colwood comprise the middle section of the watershed, while the upper and lower sections have been left in their natural state (Colwood Creek Watershed, 2013).

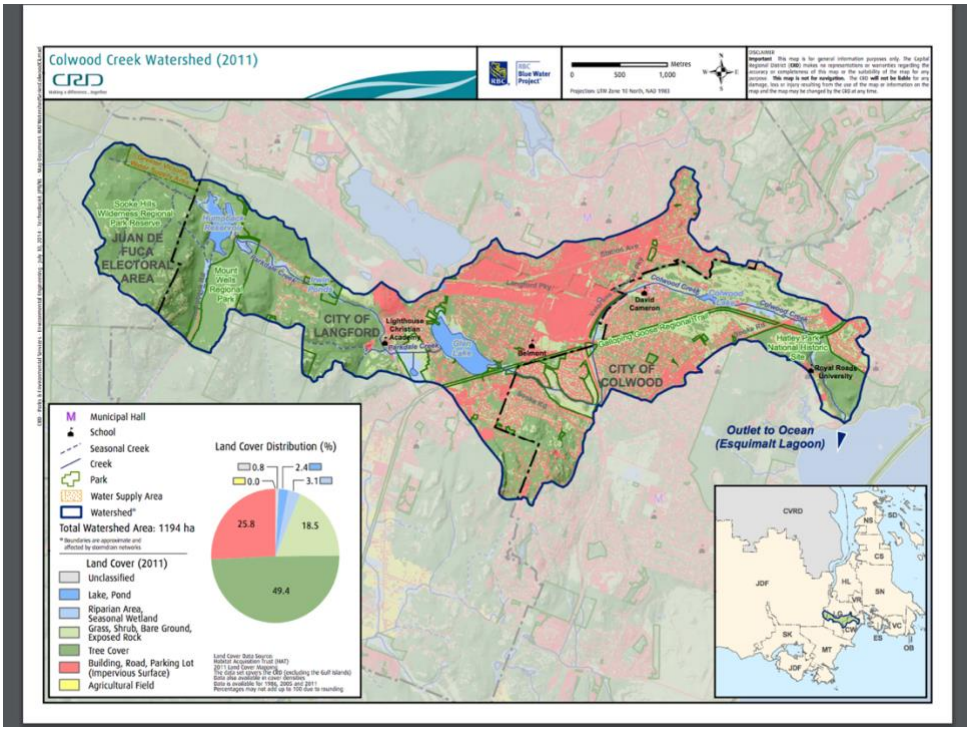

Figure 3. Colwood Creek Watershed - 2011 (CRD Map, 2019).

Prior to agricultural, residential and commercial development, the Colwood Creek watershed consisted of Coastal Douglas Fir forest covering most of the land. Coastal Douglas Fir forest thrives in dry summers, and mild wet winters - a climate consistent with that found on southeastern Vancouver Island and the Gulf Islands (Eis, Craigdallie, & Oswald, 1976). Some remaining old-growth Coastal Douglas Fir trees can be found on Royal Roads University

grounds in the lower section of the Colwood Creek watershed. These trees rank among the largest in Canada and are over 800 years old (Colwood Creek Watershed, 2013).

Within the Colwood Creek watershed, riparian zone ecosystems line the perimeter of the creek and lakes. Soils and plants adapted to growing near water comprise riparian zones. This type of ecosystem is significant in terms of its ability for storing water and filtering runoff, providing food and habitat for animals, and controlling water temperate by providing shade (Colwood Creek Watershed, 2013). While healthy sections of the riparian zone exist in the upper and lower watershed, certain riparian areas within the middle watershed have been altered due to agricultural and residential development. Potential for erosion and disconnection of the stream from its floodplain are some of the main concerns with these altered riparian areas. Fragmentation has also occurred, where land development has created isolated pockets of remaining forest separated from surrounding natural areas (Colwood Creek Watershed, 2013).

2.2 Project Focus & Scope

The ***Fostering Resilience through Physical Literacy*** project was the result of stakeholders involved in the Healthy Places Healthy People initiative of School District 62. Island Health, West Shore Parks and Recreation, SEAPARC, PISE, University of Victoria, School District 62, CRD's Active and Safe Routes to School all collaborated to obtain funding and/or implement and evaluate the initiative. Sooke School District 62 was awarded 2 grants, as part of a Healthy Schools, Healthy People Initiative. Both grants, awarded from Island Health and Sport for Life, were used to invest in the development of opportunities promoting and enhancing physical activity in 3 participating elementary schools: Happy Valley Elementary, David Cameron Elementary, and Ecole Poirier Elementary. Healthy Schools, Healthy People Initiative generated a collaboration among West Shore Parks & Recreation, Pacific Institute of Sport Excellence, and University of Victoria to implement physical activity programming in the three participating elementary schools.

The concept and purpose of the Nature Literacy Afterschool Program was based on an opportunity that arose from the ***Fostering Resilience through Physical Literacy*** project outlined above. The development of a nature-based program at David Cameron Elementary School focused on restoring connection between children and their local natural environment through a series of outdoor physical and social activities.

Project Budget

- $5000

Project Details

- **Duration:** January 2019 to March 2019 (one session per week x 8 weeks)
- **Nature Club Location:** David Cameron Elementary School Colwood, BC
  - program design based on school grounds and surrounding natural areas
- **Timing:** After school for 90 minutes one day per week (Tuesdays)
- **Program Leaders:** Deanne Taillieu, Michelle Barrette, PJ Naylor (as required)

Subject Property Address

- David Cameron Elementary School, 675 Meaford Ave, Victoria, BC V9B 5Y;
- Nearby Galloping Goose Regional Trail (off Pickford Road).

Project Coordinates

- Latitude: 48.44292o N, Longitude: 123.49637o W

Zoning

- Sooke School District 62 property

2.3 Project Goals & Objectives

Project Goal

The goal of the project was to facilitate the restoration of a connection between children and nature; whereby the development of environmental awareness is achieved by children connecting physically, socially, and emotionally with their local natural environment.

Project Objectives

- To encourage outdoor, place-based learning within the after-school context.
- To increase children's basic knowledge of local ecosystems, plants and animals through physical and social activities.
- To expose children to simple ecological restoration activities.
- To increase children's social-emotional development through nature-based activities promoting team work.
- To increase children's value for spending time in nature.

3.0 Project Methodology & Methods

3.1 Project Methodology

The Nature Literacy Afterschool Program was introduced as a pilot project at David Cameron Elementary school. Curriculum and lessons plans were developed over the fall of 2018 and the project was implemented January 22, 2019. Action Research was chosen as the methodology to guide development and delivery of the program. As an outcome-based methodology, action research aims to address problems in professional practice, such as educational settings, in order to identify solutions in a systematic way (Gall et al., 2015). Action research is usually situated within a professional context where researchers explore attitudes, behaviours and feelings. Action research aims to generate collaboration with study participants who are actively engaged in action for change (Whyte, 1991). According to Whyte (1991), participants are not passive in the research phase, but are "actively engaging in the quest for information and ideas to guide their future actions." In terms of development and implementation of Nature Literacy Afterschool Program, action research methodology was useful within the school context - where children's attitudes, behaviours and feelings were explored. Children were active participants describing what elements needed to change in their current state of physical, social-emotional, and ecological knowledge development. Their experiences were instrumental in determining solution-focused outcomes by taking action on improving their own health and ecological knowledge. Their weekly feedback was vital, in terms of deciding on upcoming activities meant to achieve optimal physical, social and ecological knowledge development, as the program was delivered. My personal role in action research was curriculum designer. I created preliminary weekly lesson plans that were often modified based on weekly feedback from the participants. I was also responsible for completing the site assessment (vegetation community mapping) from which I used to develop weekly lesson plan activities for the Nature Literacy Afterschool Program.

3.1 Site Assessment

David Cameron Elementary School is located in Colwood, BC on the southern end of Vancouver Island. The school is situated within the Coastal Douglas-Fir Moist Maritime (CDFmm) biogeoclimatic zone (Figure 4). The CDF lies in the rainshadow of the Vancouver Island and Olympic mountains; it is the smallest biogeoclimatic zone in British Columbia (B.C. Ministry of Forests and Range, 2008). The rainshadow effect influences the climate and is characterized by warm, dry summers and mild, wet winters (Nuszdorfer et al. 1991).

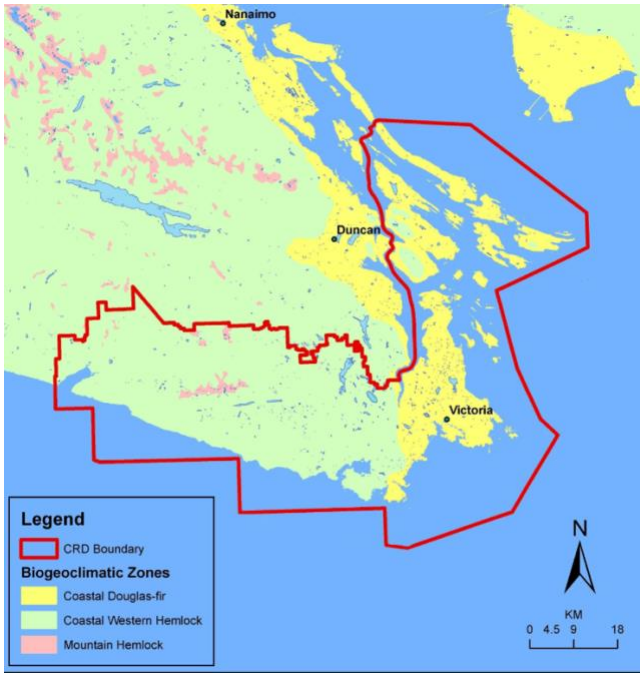

Figure 4. Biogeoclimatic Zones of Southern Vancouver Island (Data Warehouse, Province of BC, 2009)

There are about 100 species of plants found within CDF ecosystems. Some of the more common plants include trees such as coastal Douglas-fir, western red cedar, grand fir; shrubs such as salal, dull oregon grape and ocean spray; herbs such as bracken fern and vanilla leaf (Nuszdorfer et al. 1991). These plants provide shelter and food for many animal species. Some of the more common animals living within the CDF include black tailed deer, black bear and cougar, red squirrel, pileated woodpecker, steller's jay, chestnut-backed chickadee, brown creeper and chickadees (B.C. Ministry of Forests and Range, 2008).

3.1.1 Vegetation Community

Google Earth Pro was used to map out vegetation communities introduced in the Nature Literacy Afterschool Program (Figure 5). Figure 4 identifies a single transect line and two polygons that were mapped to indicate specific sections of school property used to focus vegetation mapping. A fenced area runs along Colwood Creek preventing access to riparian vegetation and waterway for student safety. However, vegetation is growing through the fencing and permitted opportunity for including some of this vegetation in the program. Two books were used to assist in plant identification and estimation of percent cover: *Plants of Coastal British Columbia* (Pojar & MacKinnon, 1994) and *Field Manual for Describing Terrestrial Ecosystems* (B.C. Ministry of Forests and Range, 2010).

Figure 5. David Cameron Elementary School – Vegetation Mapping (Google Earth Pro, 2019)

3.1.1a Transect Line and Polygons (Inventory completed at David Cameron Elementary School - September 1 & 2, 2018)

A vegetation survey of the schoolyard was conducted to determine species diversity and abundance based on total percent ground coverage of each species. iPhone GPS technology and 30m measuring tape were used to map a transect line with start and end points identified using UTM coordinates (Figure 5). The length of transect line measured 185 meters – starting at UTM coordinates Latitude: 48°26'31.17"N, Longitude: 123°29'46.98"W and ending at Latitude: 48°26'33.21"N. Longitude: 123°29'55.60"W (Figure 5). Walking along the transect line, vegetation surveying identified native and invasive plant species within 2.0 meters of each side of the transect, with transects extending 90º off the transect line, at intervals of 10 meters. There were ten transects total with each transect measuring 18.5 meters long.

In addition to the transect line, two polygons (*Polygon 1* - Latitude: 48°26'34.17"N, Longitude: 123°29'54.60"W; *Polygon 2* - Latitude: 48°26'35.31"N, Longitude: 123°29'49.00"W) were mapped to identify accessible vegetation growing through the fence along Colwood Creek (Figure 5). Please refer to the Appendix for a Table of vegetation identified along the transect line and two polygons. Table includes the following information: species identification, vegetation layer, native vs invasive species, and percent cover estimate.

3.3 Designing a Nature-Based Curriculum

Nature Literacy After School Program was designed as 'short' interactive and immersive sessions for school-aged children (Grades 3-5) that fit into the after-school recreation timetable as a club/program. Nature Literacy After School Program proposed to offer school-aged children an opportunity to be active and engaged outdoors through informal and experiential learning. Being active, outdoors, is essential for healthy development in children, as they engage with the natural world on a physical, social and emotional level. Becoming 'nature literate' addresses health concerns including physical inactivity, social-emotional challenges, as well as fading ecological knowledge and sense of stewardship among children.

Each weekly lesson plan was designed to introduce school participants to their local natural environment. Place-based learning was emphasized and described based upon existing vegetation communities surrounding the school. Each week, participants engaged in games and activities that gently introduced local ecological knowledge while encouraging physical and social engagement. Leaders and participants shared feedback on their experience at the end of each session. This feedback informed development or augmentation of lesson plans for subsequent sessions, in terms of how information was presented, how key messages were received, and what activities were enjoyed. At the end of the program, leaders, participants and parents provided feedback on the overall success of the pilot project.

3.4 Overview of Weekly Nature Literacy Activities

Outlined below, are weekly nature literacy activities that were planned for the project. Please refer to the Appendices for a full description of weekly lesson plans.

Week 1 - Wake Up Our Senses

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Explore and observe nearby natural environment
- Develop a sense of place within the natural environment and local community
- Connect with nature through by awakening our senses (touch, hearing, taste, smell, sight)

Week 2 - A Sense of Place

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- explore nearby natural environment while learning about ecosystems, and native plants.
- connect with nature through hands-on activities that inspire inquiry, imagination and enthusiasm.
- develop movement and manipulative skills by playing with nature's loose parts (logs, trees, branches, grass, dirt, water, rocks, etc.)
- Enhance mental health and promote social-emotional skill development by working together as a group

Week 3 - Finding Nature Around Me

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Create an awareness and appreciation of local natural spaces around the school
- Learn to use maps and GPS
- Develop movement and manipulative skills by exploring natural spaces and hunting for treasures
- Enhance mental health and promote social-emotional skill development by working together as a group

Week 4 - Animals Around Me

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- create an awareness and appreciation of the delicate balance of life in a food chain/web while playing an exciting game. The students will be challenged to "think like animals" in order to get enough resources.
- develop movement and manipulative skills by simulating animal movements in nature
- enhance mental health and promote social-emotional skill development by playing the game in teams of herbivores, omnivores and carnivores.

Week 5 - Eagle Eye Hide and Seek Game

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Create an awareness and appreciation of local natural spaces around the school
- Develop movement and manipulative skills by exploring the forest while playing game
- Develop observational skills of people, plants and animals
- Enhance mental health and promote social-emotional skill development by playing together as a group

Week 6 - Clean Up Our Natural Spaces

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Create an awareness and appreciation of local natural spaces around the school
- Develop movement and manipulative skills by hiking through the forest while removing garbage
- Learn about ecosystems, native plants and invasive plants.
- Learn about human impacts on natural areas (positive and negative)
- Enhance mental health and promote social-emotional skill development by working together toward a common goal of cleaning a local natural space

Week 7 - Growing a Bee-Friendly Garden with Native Wildflowers

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Create an awareness and appreciation of local native wildflowers
- Create an awareness and appreciation for pollinators such as bees and butterflies
- Develop movement and manipulative skills by scooping soil into pots and planting seeds with hands or gardening tools
- Enhance mental health and promote social-emotional skill development by planting seeds together as a group

Week 8 - English Ivy Removal

Focus: Physical Activity/Social Engagement/Environmental Awareness

Purpose

- Create an awareness and appreciation of local natural spaces around the school
- Develop observational skills for identifying invasive plants
- Develop movement and manipulative skills by removing invasive plants with gardening tools
- Enhance mental health and resilience and promote social-emotional skill development by working together as a group

4.0 Results & Interpretation

The goal of this project was to facilitate the restoration of a connection between children and nature; whereby the development of environmental awareness is achieved by children connecting physically, socially, and emotionally with their local natural environment. In total, 18 students participated in the program. Overall feedback from leaders, participants and parents suggest the program was received well and students enjoyed the activities. Some of the more favoured activities included predator/prey game and geocaching. Garbage clean-up along the Galloping Goose Regional Trail was also a popular activity, as students enjoyed putting on gloves to collect and dispose of garbage. Students felt positive about several bags of garbage they collected. Most students demonstrated learning of several plant and animal species they encountered throughout the program. This was evident during the garbage clean-up along the Galloping Goose Regional Trail when leaders informally quizzed students on plants they saw along the trail. Students also expressed enjoyment in spending time with friends outside of school hours. Students especially enjoyed working together in groups during the geocaching activity. Leaders appreciated having access to school grounds and the close proximity to natural areas for facilitating the program. Having multiple leaders co-leading the program was also important for maintaining structure and keeping students engaged throughout the sessions. Some drawbacks noted by leaders included the snow and colder weather, as some students did not like being outside in cold. During the planting a bee-friendly garden session, some students were observed to not want to touch the soil and get their hands dirty. These students opted to watch their fellow students plant their seeds, instead. The cost of nature equipment (i.e. consumables like stampers, stickers, prizes, plants, soil, pots) might have been a barrier had funding is not available.

5.0 Discussion & Recommendations

Research tells us there is a problem - children are less active, more stressed, and less connected to the natural world. Research also tells us how beneficial spending time in nature is to our physical, social-emotional health and well-being. By immersing ourselves in nature, research tells us we are motivated to learn about it and to care for it.

Throughout this program, I witnessed moments of reconnection between children and nature. Whether it was time spent sitting under the Douglas fir tree rubbing hands along the bark, or collecting plastic wrappers trapped under shrubs along the trail, the children appeared to enjoy their time spent in nature. Some plant knowledge was gained, as were some skills with navigating around the schoolyard using a satellite map.

The success of this pilot project could be used to inform environmental education and physical education curriculum in schools. Results from this project could also inform municipal, provincial, or national government policies on the development of nature-based playgrounds. My hope is to establish scientific evidence on the benefits of a nature literacy afterschool program, and to advocate for the development of more school-aged nature-based programs, throughout BC, and nationally.

6.0 Acknowledgements

As this pilot project was situated at David Cameron Elementary School, in Colwood BC, and within School District 62, I would like to acknowledge the traditional territories of the Coast Salish: T'Sou-ke Nation and Scia'new Nation, and Nuu-chah-nulth: Pacheedaht Nation.

I would also like to acknowledge Deanne Taillieu, Caitlin Lewis, and PJ Naylor for outstanding leadership, and meaningful engagement with the children, all the while ensuring sessions ran smoothly. Finally, a sincere "thank you" to everyone involved in the ***Fostering Resilience through Physical Literacy*** project, including participating students and administration at David Cameron Elementary School. This pilot project allowed me to "*put my passion into action*" ~ Restoring a Connection Between Children and Nature!

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8.0 Appendices

8.1 Vegetation Mapping Data

Table 1. Transect 1 Data

Transect #	Transect Dimensions (in meters)	Species Identified	Vegetation Layer	Native of Invasive Species	Percent Cover Estimate
1	18.5 x 4 m	Coastal Douglas-fir	Tree	native	5%
		Common Snowberry	Shrub	native	30%
		English Ivy	Herb	invasive	35%
		Oceanspray	Shrub	native	5%
2	18.5 x 4 m	Coastal Douglas-fir	Tree	native	30%
		Common Snowberry	Shrub	native	20%
		Dull Oregon Grape	Shrub	native	5%
3	18.5 x 4 m	Coastal Douglas-fir	Tree	native	50%
		Salal	Shrub	native	15%
		Dull Oregon Grape	Shrub	native	5%
		English ivy	Herb	invasive	5%
		Oceanspray	Shrub	native	5%

Table 1. Transect 1 Data - Cont'd

4	18.5 x 4 m	Coastal Douglas-fir	Tree	native	40%
		Common Snowberry	Shrub	native	30%
		Salal	Shrub	native	10%
		English ivy	Herb	invasive	5%
5	18.5 x 4 m	Coastal Douglas-fir	Tree	native	50%
		Dull Oregon Grape	Shrub	native	10%
		Salal	Shrub	native	10%
6	18.5 x 4 m	Coastal Douglas-fir	Tree	native	70%
		English ivy	Herb	invasive	10%
		Dull Oregon Grape	Shrub	native	15%
7	18.5 x 4 m	Coastal Douglas-fir	Tree	native	70%
		Salal	Shrub	native	15%
		English Ivy	Herb	invasive	5%
8	18.5 x 4 m	Coastal Douglas-fir	Tree	native	70%
		Salal	Shrub	native	15%
		Dull Oregon Grape	Shrub	native	10%
9	18.5 x 4 m	Coastal Douglas-fir	Tree	native	70%
		Salal	Shrub	native	15%
		Dull Oregon Grape	Shrub	native	10%
10	18.5 x 4 m	Douglas-fir	Tree	native	70%
		Salal	Shrub	native	15%
		Common Snowberry	Shrub	native	20%
		English ivy	Herb	native	5%

Table 2. Polygon Data

Polygon	Species Identified	Vegetation Layer	Native of Invasive Species
1	Himalayan Blackberry	Shrub	Invasive
2	Red-osier Dogwood	Shrub	Native

8.2. Nature Literacy After School Program - Materials & Equipment

Materials: ***What children will need to be active outdoors in winter***

- **An extra "top" (above the waist) layer** - A fleece jacket, sweatshirt, or sweater will help keep your child warm.
- **An extra bottom layer** - dress your child in long underwear or warm tights under regular clothes or add fleece pants over them.
- **A waterproof rain coat with a hood**.
- **Waterproof rain pants** - elastic or Velcro fastenings at the cuff to keep water out and heat in.
- **Warm socks** - Wool socks are especially warm; layering pairs of socks (a pair of synthetic socks under a pair of wool ones, for example).
- **Boots** - waterproof boots for the rain or insulated waterproof boots for snow
- **A hat** - cover the ears, fasten with Velcro under the chin
- **Mittens/gloves** - should have thumbs, so kids can play actively outdoors. For cool weather, children can wear lighter mittens, fleece or wool, with Velcro fastenings or elastic cuffs. When the weather is cold or wet, use waterproof mittens.

Equipment: ***What the program will need to run activities***

- Book: *Plants of Coastal British Columbia* (Pojar & MacKinnon, 1994).
- Satellite image maps of area and compasses
- Gardening supplies: tarp, garden gloves, tools/pruners, plants, soil, planters/pots; wildflower seeds
- Natural settings and loose parts (logs, trees, branches, grass, dirt, water, rocks, etc.)
- Nature books (plant and animal identification; gardening)
- Wagon or stroller
- Bucket and shovel
- Flashlights
- Binoculars
- Phone Camera
- Coloured paper strips
- Pinnies, scarves or vests

- Geocache treasures (nature-themed)
- First Aid Kit

8.3 Nature Literacy After School Program - Program Information

Program Details

- **Duration:** 8 weeks beginning Tuesday January 22, 2019
- **Nature Club Location:** David Cameron Elementary School, 675 Meaford Ave, Victoria, BC
    - program takes place on school grounds and natural areas in close proximity to school
- **Timing:** After school for 90 minutes one day per week (Tuesdays)
- **Nature Club Curriculum Developer**: Michelle Barrette
- **Nature Club Leaders:** Deanne Taillieu, Caitlin Lewis, PJ Naylor, Michelle Barrette

**** Week 4 session was cancelled due to snow (Feb 12)**

Format

- ***Transition*** - Student arrival, snack, ice breaker or free time activity
- ***Main Activities*** - Nature-based Activities
- ***Transition*** - Wrap up, clean-up, student pick-up

Outdoor Safety

- ***Things to avoid and the reasons:***
    - Some plants, for example, Poison Ivy, can cause itchy, spreadable, fluid-filled blisters on skin.
    - Interacting with things found in nature using our senses: observing, smelling, and touching (but not eating) natural objects.
    - Responsible handling of animals such as insects after confirming it is safe.
- ***Be weather-aware:***
    - Wearing appropriate clothes and footwear for the conditions.
    - Weather limits for outdoor experiences, e.g. class procedures in the case of extreme weather such as lightning and high winds.
    - Symptoms of hypothermia and heat stroke.
- ***Discuss how to react if injury occurs:***
    - Create a step-wise procedure for all to follow if injury occurs.
    - Post the procedure for regular review and print off a reminder sheet for outdoor student kits.

8.4 Nature Literacy After School Program Weekly Lesson Plans

Wake Up Our Senses

- **Time:** 30 minutes
- **Equipment:** access to local natural environment; samples of store-bought lettuce for tasting (if desired)
- **Layout:** Schoolyard property

Activity Procedure and Key Messages

- Explain to students they will be going on a ***sensory wake up*** walk to observe and investigate the local environment.
- Review what the five senses are and what they are used for.
  - **Sight, hearing, touch, smell and taste**
- When outside, begin the observations with the weather. Ask students if they can:
  - **SMELL** - wind, rain, sun
  - **HEAR** - wind, rain
  - **SEE** - sun, clouds, snow, rain, wind
  - **TOUCH** - sun, rain, snow
  - **TASTE** - rain, snow
- Walk around the schoolyard where there are trees, shrubs or other plants. Ask students to:
  - **SMELL** a tree or shrub and describe what they smell.
  - **HEAR** a tree or shrub and describe what they hear.
  - **SEE** a tree or shrub and describe what they see.
  - **TOUCH** a tree or shrub and describe they feel.
  - **TASTE** - taste samples of lettuce and describe they taste ***see note below***

Conifers, Western Red and Yellow Cedars have scaly type needles and a property that make their wood a natural insect repellent that is present in their needles. As such, they are not fit for eating. Students should be aware that tasting of wild plants and berries should be done only with the supervision and help of an adult.

A Sense of Place - Winter Scavenger Hunt

- **Time:** 30 minutes
- **Equipment:** Winter Scavenger Hunt Cards (found on the following pages below); Book: *Plants of Coastal British Columbia* (Pojar & MacKinnon, 1994).
- **Layout:** Natural areas lining schoolyard property

Activity Procedure and Key Messages

- Leaders to locate and familiarize themselves with Scavenger Hunt vegetation within schoolyard boundary before activity begins.
- Explain to students they will be going on a ***Winter Scavenger Hunt*** to explore and learn about their local natural environment.
- Assign students into groups of 2 or 3 students each and provide each group with a winter scavenger hunt card.
- Ask students if they can spot objects on scavenger hunt cards, as their groups walk around the natural areas around the schoolyard.
- When groups have spotted an object, have students read a brief description of the vegetation they have identified to their groups (plant names; native vs invasive).
- Challenge the students to identify as many objects as they can on the Scavenger Hunt Cards in 30 minutes.

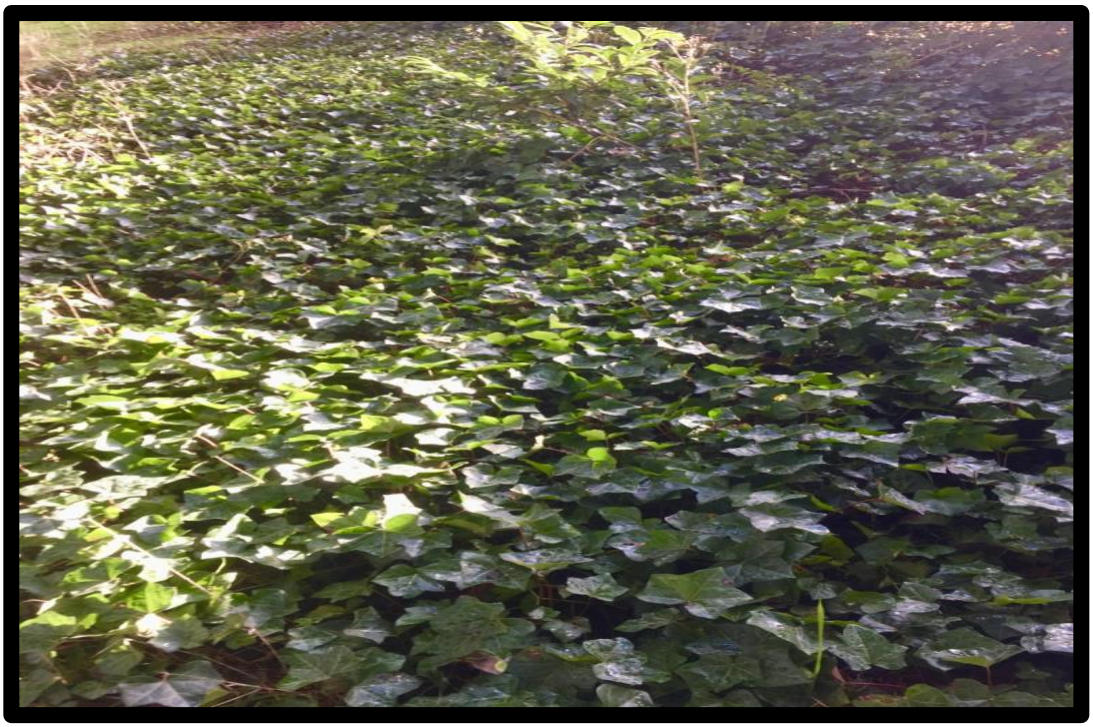
Coastal Douglas Fir Tree

Description

- A tall evergreen tree sometimes growing up to 90 meters.
- The bark is reddish brown and deeply grooved, the needles are yellowish-green, and the pollen cone is small and reddish-brown.
- Douglas fir grows in dry, rocky areas as well as temperate rainforests.

Traditional Ecological Knowledge

- Traditional First Nations Peoples used its wood for fires, fishing hooks and snowshoes. Its branches were used for bedding and the seeds of the tree were eaten.



English Ivy

Description

- English ivy is an evergreen vine with dull waxy green leaves that grow along trailing or climbing stems.
- English ivy grows well in moist, open forests.
- Thick ivy mats grow over plants on the forest floor and prevent native plants from growing.
- English ivy is a serious invasive plant found in much of southwestern BC.

Dull Oregon Grape

Description

- A tall evergreen plant with pairs of spiny leaves growing from stems up to 60 centimetres long.
- Leaves can turn purple and red in winter. It produces bright yellow flowers and blue berries.
- Plant grows from Vancouver Island down to northern California. It likes both dry and moist areas and is often found growing under Douglas fir trees.

Traditional Ecological Knowledge

- First Nations Peoples ate the berries when mixed with a sweeter berry like Salal. The bark and berries were used as medicine for the liver and eyes.

Common Snowberry

Description

- A small native shrub with oval leaves and small twigs.
- Flowers are pinkish-white, bell-shaped and grow in clusters. The fruits are round and white, and they stay on the plant throughout winter.
- Common Snowberry is found from Alaska, down along southwest coast of BC, to the northwest US. They grow in dry or moist openings, forests, rocky areas and even along beaches.

Traditional Ecological Knowledge

- Traditional First Nations Peoples considered snowberries poisonous. Occasionally, one or two berries were eaten to settle the stomach after eating fatty food.

Himalayan Blackberry

Description

- An invasive evergreen shrub with prickly stems that grow along the ground.
- It grows well along roadsides, rivers and stream banks, and around forest edges.
- Flowers are small, white or light pink in colour. Fruits are black and shiny. The fruits ripen from mid-summer to fall and are safe to eat.
- Himalayan blackberry prevents native plants from growing by forming large, thick mats that prevent movement of animals.

Red-Osier Dogwood

Description

- A native shrub, up four metres tall, with pointed oval leaves, bright red stems, whitish-green flowers and small white berries.
- It grows in moist soils near stream banks, swampy thickets, and open forests throughout the southern coast of BC.

Traditional Ecological Knowledge

- Traditional First Nations Peoples ate the bitter berries and boiled the bark to use as medicine to relieve pain and swelling.

Finding Nature Around Me - Nature Geocaching

- **Time:** 30 minutes total
- **Equipment:** Satellite Maps of David Cameron Elementary Schoolyard; 6 "geocache" containers containing nature-related treasures; 6 skill-test questions for each container at each of six geocache locations
- **Layout:** Schoolyard property

Intention

- To introduce students to simple satellite map reading and locating places on map
- To reinforce learning from last session (name of plant; invasive or native plant)

Preparation - Before Session

- This activity is based on location of plants introduced last session:
    - ***Douglas Fir; English Ivy; Dull Oregon Grape; Common Snowberry; Himalayan Blackberry; Red-Osier Dogwood***
- Leaders will hide six 'geocaches' at each of the 6 plant locations, identified last week **(*6 containers in which a small nature-related treasure item is placed*)**.
- Each of the 6 geocaches contains a simple skill-test question that students answer before receiving the treasure (to reinforce learning from previous week).
- Ensure enough treasures available for the number of student groups participating.
- Leaders will indicate location of each geocache on satellite image of schoolyard **(*indicate each location with an "X" on satellite image*).**

Activity Procedure and Key Messages

- Explain to students they will be going on a *Nature Treasure Hunt* to find treasure
- Explain to students they will hunt for treasures while learning to find their way around their local environment using a map.
- Divide students into small groups (3 groups of 5, or 4 groups of 4).
- Provide each group with a satellite image map of their schoolyard to find treasures.
- Leaders to demonstrate how to use satellite image map to navigate around the schoolyard.
- Leaders will supervise groups, and provide assistance, as needed.
- Students to find as many treasures as they can in 30 minutes.

Geocache 1

Question - What is the name of this plant?

Answer - *Douglas Fir Tree*

Geocache 2

Question - Is this plant native or invasive?

Answer - *Invasive Plant*

Geocache 3

Question - What is the name of this plant?

Answer - *Dull Oregon Grape*

Geocache 4

Question - Is this plant a *native plant* or an *invasive plant*?

Answer - *Native Plant*

Geocache 5

Question - What is the name of this plant?

Answer - *Himalayan Blackberry*

Geocache 6

Question - Is this plant a *native plant* or an *invasive plant*?

Answer - *Native Plant*

Animals Around Me - Predator/Prey Game

- **Time:** 30 minutes total (10 minutes for Phase 1; 20 minutes for Phase 2)
- **Equipment:**
    - 18 coloured pinnies for 18 students (4 red pinnies for cougars; 14 other coloured pinnies for deer)
    - 42 coloured tokens for food (e.g. poker chips or bottle caps)
    - 14 tokens for each of 3 food types (1 token for each deer for each food type)
    - 14 life tokens (1 token for each deer)
    - 6 buckets
- **Layout:** Schoolyard property

Activity Procedure and Key Messages

- Explain to students they will be playing a game of tag called ***Predator/Prey***. The goal of the game is to survive.
- Review what a predator is and what a prey is.
    - Predator is an animal that hunts and seizes other animals for food.
    - Prey is an animal that is hunted and eaten by a predator.

Can students name an example of each that live in our region of BC? ***Predator/Prey*** game will include two common mammals that live with us in our region of BC: Cougar (*Puma concolor*) and Black-tailed Deer (*Odocoileus hemionug columbianus*).

PHASE 1 - Predators and Prey **(Cougar and Black-Tailed Deer)**

Set-Up

- **Divide students up into 2 groups:**
    - one quarter of the students will wear RED-coloured pinnies (cougar), and rest of students will wear any another colour pinnies (black-tailed deer).
        - *e.g. with 20 kids: 5 students will be cougars. 15 students will be deer.*
    - Establish a resting place for captured deer

Play Game

- The object of the game is for those wearing cougar pinnies to tag all of the deer wearing other colour pinnies, as quickly as possible.
- Students who are caught must give up their pinnies and be escorted to the resting place. The game continues until all the deer are caught.

- The number of pinnies that each cougar has collected will be counted. Winning team will have collected the most pinnies.
- Repeat the game with different students wearing the pinnies of the cougars, if desired.

PHASE 2 - Plants **(introduce plants as food for deer) *As time permits**

Set-Up

- In this phase, deer have food to eat - different coloured tokens represent 3 different foods for deer
    - e.g. yellow - lichen, green - grass, blue - salal
- 14 coloured tokens for each of the 3 food types - 42 food tokens total
- Spread 6 buckets around schoolyard
    - each bucket containing 7 food tokens
- Leaders to keep 14 orange "Life Tokens" (one for each deer) and extra pinnies for deer brought back to life
- Establish a resting place for captured "dead" deer (Leaders to remain in this area)

Play Game

- Play the game, as in Phase 1, except each deer has to collect 3 different food tokens from the different buckets.
- Once a deer has collected 3 different coloured tokens, they bring the tokens to the Leaders and exchange them to bring one "dead" deer back to life
    - Leader gives deer a pinnie and they re-enter game
- Captured "dead" deer can help return food tokens to buckets, as needed.
- If there are no "dead" deer to return to the game, a deer can trade 3 food tokens for a "Life Token."
- Deer can use their "Life Token" if they are captured later by a cougar
    - e.g. deer give life token to cougar and keep their pinnie, or
    - deer can trade their "Life Token" to bring a "dead" deer back to life
- Cougars can trade 3 deer pinnies, or collected life tokens, for a dead deer to be brought back to life as a cougar (wearing a RED cougar coloured pinnie).
- End game after 30 minutes and assess who survived.

Caring for Our Natural Spaces - Nature Trail Clean Up

- **Time:** 90 minutes total (20 minutes travel to/from school; 50 minutes along Galloping Goose Regional Trail)
- **Equipment:** 1 or 2 wagons, garbage bags, heavy duty work gloves, rake, shovel
- **Layout:** Galloping Goose Regional Trail extending to forested area backing onto Veteran's Memorial Parkway

Activity Procedure and Key Messages

- As a group, walking from schoolyard, along Pickford Rd to Galloping Goose Regional Trail.
- Heading west along trail, pick up garbage accumulating in the vegetation.
- Leaders to discuss why it is important to take care of natural areas.
- Students can name familiar plants identified in previous activities from past weeks.
- Leaders supervise and assist students with collecting garbage.
- Pack up tools, place garbage bags inside wagons and head back to school.
- Collected garbage bags to be disposed of by leaders.

Nature's Pollinators Are Important - Growing a Bee-Friendly Garden *activity requires wildflower seeds

- **Time:** 30 minutes
- **Equipment:** Pacific Northwest Blend seeds (from West Coast Seeds), 18 plastic pot, soil, tarp, scoops or shovels
- **Layout:** Schoolyard property

Activity Procedure and Key Messages

- Leaders to explain the importance of bees as pollinators for flowers, fruits, and vegetables.
- Bee populations are declining in numbers because of loss of habitat, pollution, and pesticides.
- Creating bee-friendly gardens will help provide food and shelter for pollinators.

Instructions for Planting Wildflower Seeds

- Fill pot with soil ¾ full
- Sprinkle wildflower seeds on top
- Add small amount of soil to just cover seeds
- Water seeds
- Place pot in sun and keep soil moist
- Once plants start to outgrow pot, transplant into a bigger pot or garden

***Nature's Pollinators Are Important (Part 1)* - Growing a Bee-Friendly Garden *activity requires sprouted plants for transplanting**

- Time: 30 minutes
- Equipment: wooden wagon(s) or metal wagon, fibre plant liner or tarp; soil, scoops or shovels
- Layout: Schoolyard property

Activity Procedure and Key Messages

- Before creating raised wagon garden bed, ask students what they know about pollinators; discuss why we are creating a pollinator-friendly garden
    - Butterflies, birds, and bees are important for creating and maintaining habitats and ecosystems that many animals rely on for food and shelter.

- Many pollinator populations are declining in numbers because of loss of habitat, pollution, and pesticides.
- Creating pollinator-friendly habitats - like gardens, will help provide food and shelter for pollinators.

- Divide students into 2 groups and provide one wagon per group.
- Have students in both groups prepare their wagon garden beds by lining their wagon with plant liner
- Have students use shovels or scoops to fill their wagon with soil
- Set wagons aside in storage until next week for planting

***Nature's Pollinators Are Important (Part 2)* - Growing a Bee-Friendly Garden *activity requires sprouted plants for transplanting**

- **Time:** 30 minutes
- **Equipment:** Native plants, shovels, wagons, water
- **Layout:** Schoolyard property

Activity Procedure and Key Messages

- Before transplanting, ask students what type of plants might be attractive to pollinators
  - Native plants (plants that naturally grow in our region); colourful and fragrant flowers
- Retrieve prepped wagons from last week
- Gather groups and provide them with native plants to be transplanted to wagon garden.
- Provide each group with descriptions of selected native plants (how much water or sunlight do they need?)
- Have students take turns creating holes in soil, removing native plant from pot and then planting them into garden.
- Set wagons in sunny area.
- Have students create ongoing maintenance schedule for watering and weeding for pollinator-friendly garden.