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The Fruits of Nature

Investigating the Prospects for Fruit Trees on Halifax School Grounds

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Abstract

Urban youth lack a connection to the natural world and to their food sources. Connections to the natural world can be enhanced by placing food production sites on school grounds. In this study the walk-about interview technique was used to determine interest in implementation of orchards at five schools in Halifax. Nine school leaders were interviewed, including parents, principals, and teachers. Participants were asked to identify existing outdoor collaborative projects on school grounds. These included raised-bed vegetable gardens, fruit trees and bushes, native species and pollinator gardens, outdoor classrooms, and a greenhouse. In addition, participants were asked to identify benefits, barriers, and assistance needed to implement orchards on school grounds. School grounds were also observed to determine space for fruit trees.

Results indicated high social and biophysical capacity for orchards on Halifax school grounds. The main benefit identified by participants was increased connection to nature and food sources youth would experience by being involved in the maintenance of a school orchard. Most participants had already witnessed student involvement with food production through existing gardening projects on school grounds. Within the range of opportunities for the urban community of Halifax to engage in learning about food production, schools are likely the most effective.

Acknowledgments

1. Introduction

<u>Statement of the Problem</u>

Urban youth lack a connection to the natural world and to their food sources (Louv, 2005). Free play and exposure to nature are beneficial experiences for youth (Louv, 2005), and can be incorporated into early education by placing food production sites on school grounds. Urban food production is rapidly increasing in popularity around the world (Mougeot, 2006). First initiatives focused on gardens but recently orchards in urban environments have become more common (McLean, Poe, Hurley, Lecompte-Mastenbrook & Emery, 2012). Within the range of opportunities for the urban community of Halifax to engage in learning about food production, schools are likely the most effective (Lesko, Roach, Marshman, & Slapcoff, 2014).

The idea that modern youth lack a connection to nature has been coined by Richard Louv as the "nature-deficit disorder" (2005, p.10), a term that sparked a world-wide movement attempting to get more youth outdoors. (Campbell & Spaulding, 2010). Louv (2005) argues that nature was once about interaction and activity, but has graduated into something that is merely observed from afar. Many youth have no memory of the dying culture of farming as fewer people today raise food and animals than in previous centuries (Louv, 2005). Advancements in technology have decreased the amount of time young people spend outdoors, and for some the constant screen time prevents the development of meaningful interpersonal relationships (Brody, 2012). More time spent outdoors in one's youth has been proven to lead to strong environmental values in some adults (Sobel, 1996). A young persons experience in the outdoors can be therapeutic, restorative, intelligence-enhancing (Louv, 2011). The sedentary lifestyles of youth in Halifax concern residents, as two thirds of adult men and half of adult women are overweight or obese (Lesko, Slapcoff & Roach, 2014; Vital Signs, 2010). Active outdoor education

experiences such as maintenance of fruit trees and harvesting could help to reverse this trend (Burke, 2005). Research results indicate that youth are more likely to eat foods they have grown themselves, so involving youth in an urban orchard project might lead to increased fruit consumption.

Purpose of Study

The purpose of this study was to determine interest in the implementation of urban orchards at schools in Halifax. In this case study I interviewed nine adult school leaders from five schools on the Halifax Peninsula. The experiences of individuals working on outdoor collaborative projects at schools, such as gardens and outdoor classrooms, was useful in determining social capacity for orchards. Research outcomes may prove useful in developing programs to implement urban orchards at Halifax schools. Additionally, understanding individual thoughts on what an urban orchard could be might help to more clearly describe the recent phenomenon that is lacking the attention of researchers (Clark & Nicholas, 2013). This research brings attention to the work being done by individuals in Halifax dedicated to providing hands-on learning experiences to youth. The work being done has enhanced the edible landscape of Halifax, providing students with the educational benefit of being connected to the production of their food (Burke, 2005). School orchards could further this learning experience, providing significant benefits for youth.

Significance of the Study

In January 2014, Mayor Mike Savage supported a motion to develop an urban orchard pilot project to increase the edible landscape within Halifax Regional Municipality (HRM) (Bates, 2014). An edible landscape is a site of food production where informal learning occurs as people connect with nature by gathering food (Burke, 2005; Mclean et al., 2012). The term urban

orchard has not yet been clearly defined, but a community orchard could be a grouping of fruit trees cared for by local citizens (Abernethy, 1996). Mayor Savage identified a healthy Halifax community as one of Council's core priorities (Bates, 2014). City Council is concerned that Halifax residents are less active than they were thirty years ago and obesity rates are increasing (Bates, 2014; Vital Signs, 2012). Council's goal of prioritizing local food production and promoting community food security may be achieved through a successful urban orchard pilot plan that involves citizen participation during all planning and implementation stages (Bates, 2014).

The urban orchard pilot plan will be developed within the scope of HRM's existing Urban Forest Master Plan (UFMP), a document outlining goals for the Halifax urban forest based on neighbourhood divisions (HRM Urban Forest Planning Team, 2013). The intent of the UFMP was to produce a plan with management strategies to "maximize the urban forest" (HRM Urban Forest Planning Team, 2013, p. x). The urban forest includes every tree within a city, including those that provide goods and/or services to citizens (HRM Urban Forest Planning Team, 2013; McLean et al., 2012). A few benefits of urban trees include carbon capture and storage, biodiversity enhancement, and contributing to citizens' sense of well-being (HRM Urban Forest Planning Team, 2013). Fruit trees should be included within the parameters of an urban forest, since fruit trees provide the same services as other trees while contributing to the edible landscape (McLean et al., 2012).

Research into the perspectives of adult school leaders about urban orchards on school grounds could assist in working fruit trees into the definition of the urban forest. At an urban orchard workshop held at Dalhousie University in June 2014, participants agreed that education and community engagement would be important in ensuring the development of a sustainable

urban orchard in HRM (Lesko et al., 2014). When asked what the most important criteria of orchards should be, some workshop participants agreed urban orchards should focus on youth and schools (Lesko et al., 2014). A number of participants at the workshop maintain urban orchards and gardens in HRM (Lesko et al., 2014). Their ideas about connecting urban orchards to youth education and community engagement (Lesko et al., 2014) support urban orchards on school grounds.

Research Objectives & Research Questions

Research Objective: To discover the interest and opinions of school leaders, primarily principals, teachers and parents, in establishing urban orchards at Halifax schools.

Research Question 1: In cases where Halifax schools have sufficient space for even a few fruit trees on schools grounds, to what degree would school staff (e.g. principals) and parent leaders be interested in pursuing the development of such orchards?

This question helped to determine the social capacity for urban orchards in Halifax based on the experience of those who may have already been involved in collaborative outdoor learning projects with Halifax students.

Research Question 2: What do staff and parent leaders of schools identify as major opportunities for and constraints against the development of urban orchards on school grounds?

Secondary questions and probes were used to determine various factors that school leaders identifed as either beneficial or challenging.

2. Literature Review

The Urban Forest Concept

Municipalities are increasingly taking up UFMPs to promote the benefits and services of urban trees (HRM Urban Forest Planning Team, 2013). Trees enhance social experiences,

(Sullivan, Kuo & DePooter, 2004) as well as providing economic services by increasing residential property values in high canopy areas (McLean et al., 2012; Zhang, Hussain, Deng, & Letson, 2007). Fruit trees provide these as well as other benefits, yet are often left out of urban forest conceptualizations. For example, Seattle's municipal laws and the city's UFMP prohibit the planting of apple, cherry and pear trees on streets (McLean et al., 2012). The municipality is concerned about the danger of falling fruit (McLean et al., 2012). Fruit trees planted in public urban areas could promote the gathering and gleaning of healthy fruit by citizens (McLean et al., 2012). The Seattle-based group Community Fruit Tree Harvest works toward changing these regulations to "promote the cultivation of fruit in urban landscapes, build community and protect the climate" (McLean et al., 2012, p.192).

The urban forest has long been viewed as a service provider, while rural forests are seen as places of production (McLean et al., 2012). This normative vision of forestry globally is inaccurate, for in reality many urban forests provide products (McLean el al., 2012). Urban populations have long relied on both the services and products of nearby forests. In *The Forest and the City; The Cultural Landscape of Urban Woodland*, Konijnendijk refers to "working trees" that provided products such as fruit, flowers, medicine and herbs to medieval townspeople (2008, p. 49). Working trees were relied on for dietary and medical needs, and their products were easily accessed since the wildwoods were not owned (Konijnendijk, 2008). Increasing food-producing trees can "improve the sustainability and resilience of urban communities" (Clark & Nicholas, 2013, p.6). Konijnendijk (2008) stresses the important of increasing urban forest use by youth, which could instill in them strong connections to the natural world (Louv, 2005).

Halifax's UFMP includes Community Engagement Reports in its appendices that indicate a plan to plant a grove of fruit-and nut-bearing trees in a public park (HRM Urban Forest Planning Team, 2013). The trees should be considered as part of the "food forest" since they will provide edible products for citizens (HRM Urban Forest Planning Team, 2013, p. 414). The creators of the Halifax UFMP ensure citizens that they will see more fruit-and nut-bearing trees planted in the future (HRM Urban Forest Planning Team, 2013). An edible landscape is one that might include "fruit, nut, berry trees as part of landscape – bring(ing) in permaculture principles to build overall ecology and sustainability of landscape" (HRM Urban Forest Planning Team, 2013, p. 415). The planting of fruit trees would contribute to the UFMP's objectives of maximizing carbon uptake, increasing canopy cover, while increasing the amount of edibles available from the urban forest (HRM Urban Forest Planning Team, 2013).

<u>Benefits of Trees</u>

The benefits that trees provide to humans extend from ecosystem services to enhanced social well-being (Sullivan et al., 2004), educational benefits (Skelly & Bradley, 2007) and increased connection to nature (Thoreau, 1862). A study carried out by Sullivan et al. (2004) discovered that residents of a low-rise housing complex in Chicago were more likely to socialize in vegetated common areas compared to barren areas. Trees can entice urban residents outdoors to eat, socialize, rest, do chores, and play (Sullivan et al., 2004).

Increased vegetation may also correlate with decreased criminal activity (Kuo & Sullivan, 2001). By observing crime rates in 98 urban neighbourhoods, Kuo & Sullivan (2001) discovered fewer reports of violent behavior in areas with more greenery. The level of social interaction in a community may increase with the presence of trees and other vegetation, and property and violent crime rates may be lowered (Sullivan et al., 2004; Kuo & Sullivan, 2001).

Time spent outdoors has the potential to increase individual well-being. During the 19th century, scholars were engaging with nature and documenting the benefits of time spent outdoors (Thoreau, 1862). Thoreau (1862) wrote that time spent in the woods away from cultured society in the city induces deep contemplation, sensitivity and a greater appreciation for the natural environment. More recently, Ulrich (1979) conducted an important study determining that people who viewed photographs of unspectacular natural environments experienced more positive emotions and moods compared to individuals who were shown urban images. Individuals tended to prefer urban images that included some trees and/or other vegetation (Ulrich, 1979). In fact, participants that viewed nature scenes experienced higher alpha wave magnitudes in the brain, associated with increased serotonin levels (Logan & Selhub, 2012). Additionally, some residents of Ann Arbour specifically took a longer route to get a major mall because it was a more scenic alternative than the expressway (Logan & Selhub, 2012). Simply viewing images of nature has been linked to stress reduction and improved physiology.

Time spent in natural environments has been linked with improved directed attention (Kaplan, 1995). More time spent outdoors has also been linked with improved cognitive conditions, the reduction of stress and depression (Louv, 2005). Time spend outdoors is especially important for youth, who often learn better through primary experiences where their senses are engaged in free play (Louv, 2005). Engaging with nature in a school setting has led to increased positive attitudes towards environment and higher aptitudes for subjects such as science (Skelly & Bradley, 2007). This was determined through a study that observed 437 third-grade students who participated in campus gardening activities (Skelly & Bradley, 2007). High environmental scores were found for those involved in low-to-medium intensity vegetable gardening (Skelly & Bradley, 2007).

The recent emergence of outdoor gardens on school grounds challenges the notion that youth lack a connection to nature and are becoming increasingly sedentary (Louv, 2005). Outdoor collaborative projects on school grounds enhance young students' ability to engage with environmentally-themed lessons. Environmental curriculum needs to be developmentally appropriate, or else youth with become overwhelmed with the magnitude of the ecological problems facing society (Sobel, 1996). It is important for youth to develop an appreciation for the natural world through imaginative play before they are burdened with environmental concerns to avoid eco-phobia, the fear of environmental problems and the outdoors (Sobel, 1996). Learning from the environment outside of the classroom allows children to develop feelings of environmental responsibility and stewardship (Sobel, 1996). Experiential learning allows some students to thrive outside of the classroom while developing life-long skills (Graham et al., 2005).

<u>Barriers to Urban Orchard Development</u>

Fruit trees within the urban forest contribute to urban food production yet are not commonly integrated into municipal urban forest planning (Gazibara, 2011). Urban forestry and urban agriculture are too often conceptualized as separate (Clark & Nicholas, 2013). Halifax's UFMP indicates an objective to increase the amount of edibles from the urban forest (HRM Urban Forest Planning Team, 2013). To date, many barriers have prevented the development of an orchard in the city. Fruit trees require a large supply of water, experienced pruners, harvesting, fruit thinning, and pest control (Gazibara, 2011). Gazibara (2011) used spatial analysis to estimate a front-yard capacity of about 15 fruit trees per 100 m of street in Halifax. Halifax has substantial biophysical capacity to plant fruit trees (Gazibara, 2011).

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A barrier commonly identified in consideration of urban forest planning is inadequate funding (Zhang et al., 2007). Financial support should come from a variety of sources including government, non-profits, businesses, and individuals (Zhang et al., 2007). Zhang (2007) looked into individual willingness to pay for urban forestry programs and found that those younger than 56 with a full-time job earning more than $75,000 US per year were most likely to donate money and time towards urban forestry programs. Individual willingness to pay is associated with what people perceive as the positive elements of trees (Lorenzo et al., 2000). In a New Orleans-based study, 80% of survey respondents viewed protection and preservation of urban trees as very important and as something they would be willing to pay for (Lorenzo et al., 2000). Although funding for urban forest maintenance and protection is often scarce, many individuals are willing to pay out of pocket to enhance the urban forest (Lorenzo et al., 2000; Zhang et al., 2007).

Mayor Mike Savage's motion to develop an urban orchard pilot plan is to be completed within the scope of Halifax's UFMP (Lesko et al., 2014). Community members, urban gardeners, academics, and policy makers at an urban orchard workshop held at Dalhousie University in June 2014 agreed that education and community engagement could be the main benefits of implementing an urban orchard in Halifax (Lesko et al., 2014). Many participants agreed that youth should be the focus of urban orchard education programs (Lesko et al., 2014, p.4). School-based urban orchards suit these criteria.

The importance of involving citizens in the planning, implementation, and maintenance of orchards was stressed at Halifax's urban orchard workshop (Lesko et al., 2014). The involvement of citizens in the planning process of any urban forest initiative is important to prevent conflicts (Konijnendjik, 2008). One of the barriers to orchard development identified was ensuring a strong volunteer commitment (Lesko et al., 2014). Urban environments have an

abundance of readily available volunteer labour, so the challenge is to ensure long-term commitment (Clark & Nicholson, 2013). Discussions about what a sustainable urban orchard could look like in Halifax have begun and continue to develop.

<u>Outdoor Collaborative Education</u>

The modernization of the food industry meant that by the mid-20th century, urban youth were no longer observers of the agricultural process (Burke, 2005; Louv, 2004). Individuals no longer need to get their hands dirty in order to eat. Burke argues that today the image of a child labouring for food is one of "exploitation, oppression…even slavery" (2005, p. 584). The kindergarten movement of the 1920's and1930's introduced gardens to school grounds, and students grew and harvested vegetables for the school lunch program, gaining an appreciation for nature and learning about landscape management (Burke, 2005). Eventually, the practice of school gardening was deemed unacceptable for some students and was targeted towards students with lower levels of intelligence (Burke, 2005). At the same time, the industrial population became reliant on convenience foods and many lost their connection to food sources (Louv, 2005). However, interest in urban gardens on school grounds has recently been rising, (Skelly et al., 2007) connecting urban youth to the source of their food.

When students collaborate on projects outdoors and the experience ties into school curricula, they may absorb lessons better (Skelly et al., 2007). An individual interviewed by Burke fondly remembers when his schoolyard had an orchard and the grounds became "a food and flower adventure for play and pleasure, learning and construction: both beautiful and functional" (2005, p. 581). Few school-based urban orchards have been well documented. Understanding how school gardens play a role in advancing educational and environmental lessons for youth may be useful in determining if a school-based urban orchard would benefit

youth. Based on experiences of adult school leaders initiating outdoor project on Halifax school grounds, being involved in the development of school-based orchards would benefit youth.

In a California study, school principals were surveyed to find out perceptions of using school gardens in an academic setting (Graham et al, 2005). 69% of respondents found gardens to be useful teaching tools for advancing science (Graham et al., 2005). Respondents agreed that it was easier to match gardens to curriculum of a kindergarden to grade-eight level than to high-school level, and that hands-on experiential learning provides students with life-long skills like critical thinking and problem-solving (Graham et al., 2005, p. 150). Some barriers identified by principals were lack of time, interest, knowledge, experience, and training as well as a lack of curriculum to link to the garden learning experience (Graham et al., 2005, p. 149). Most principals did not cite school gardens as major contributors to food production for school lunch programs (Graham et al., 2005). This finding coincides with the respondents at the Halifax urban orchard workshop who did not cite local food production as an important aspect of a Halifax orchard (Lesko et al., 2014).

Urban gardens on university campuses have been found to provide a "campus living laboratory" in which students learn from hands-on experiences (Chambless et al., 2012, n.p.). At the University of Utah, students who admitted to having lost interest in school felt renewed after working in the garden, where they learned about environmental and health impacts of an urban landscape and provided food for their community (Chambless et al., 2012). In 2011, the student-run 1,200-m garden generated $3,000 in revenue from the fall harvest alone (Chambless et al., 2012). Aside from the possible economic benefits of a well-organized urban garden, the experience of being involved can increase levels of environmental awareness and responsibility (Chambless et al., 2012; Skelly et al., 2007).

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<u>Public Urban Orchards</u>

Although school-based food production initiatives have focused on gardens, interest in urban orchards has been rising recently (McLean et al., 2012). Orchards are popping up in public parks, where volunteers maintain orchards in exchange for a fresh supply of fruit. An urban orchard may involve fruit overhanging in public spaces such as sidewalks, streets and parking lots, making it public property (Anonymous, 2007). Such fruit could be considered as part of a community orchard where trees are managed by locals, resulting in an enriched landscape and increased use of public space through education and recreation (Abernethy, 1996). Promoting the cultivation or urban fruit contributes to the edible landscape and could re-localize food production (McLean et al., 2012).

Urban orchards have been successfully implemented around the world. The non-profit organization LEAF, based in Toronto, provides trees for urban residents to plant on their yards as well as training from expert volunteers, resulting in a 90% tree survival rate (LEAF, 2012). The organization also provides volunteer training programs, tree tours, and workshops (LEAF, 2012). Another initiative in Toronto is the Ben Nobleman Park Community Orchard, founded by Susan Poizner and Sherry Firing, which is Toronto's first community orchard (Ben Nobleman Park Community Orchard, 2013) (Lesko et al., 2014). Volunteers collaborate and divide up the orchard work of pruning and collecting fruit in addition to distributing fruit between volunteers and local food banks (Ben Nobleman Park Community Orchard, 2013). Both of these Canadian initiatives were referred to at the Halifax urban orchard workshop as examples of sustainable orchard planning with a strong volunteer base, something that Halifax is planning for (Lesko, et al., 2014).

Initiatives indicate that interest in public urban orchards is increasing. In central Halifax, fruit and nut trees have been planted at the Common Roots Urban Farm (HRM Urban Forest Planning Team, 2013). On October 18th 2014, fruit trees and shrubs were planted by community volunteers in the Dartmouth Commons (Halifax, 2015). In Los Angeles, Tree People (n.d.) distributes fruit trees to low-income communities funded by donations from sponsors. Some of the donated trees are planted on school grounds, and Tree People provides expertise in areas of design, tree care, and education (Tree People, n.d.). The Fruit Tree Planting Foundation (2005), based in Pittsburgh, aims to plant 18 billion fruit trees across the world through donations at public and non-profit schools. The goal is to allow students to learn from growing and harvesting fruit while restoring native plant ecosystems by planting fruit trees amongst soil-building flora, native and medicinal plants, trees and shrubs (The Fruit Tree Planting Foundation, 2005).

Orchards are being implemented abroad where trees are sent to communities in Tanzania for school children to plant and maintain (School Orchards Africa, n.d.). Individuals from local NGO TanCan assist elementary schoolchildren and their teachers with planting, harvesting, and other silviculture skills (School Orchards Africa, n.d.). Within five years of being planted, the fruit from the trees is sold by the youth, with surplus income going into secondary school funds for participants (School Orchards Africa, n.d). Youth worldwide are learning about care and maintenance of urban orchards while observing localized food production.

Interest in urban orchards is rising in Halifax and around the world (Lesko et al., 2014; School Orchard Africa, n.d.). Outdoor collaborative projects on school grounds such as gardens have been effective in teaching environmental and science lessons as well as instilling nature appreciation in youth (Skelly & Bradley, 2007). Orchards on school grounds may have the ability to teach similar lessons to youth (Burke, 2005).

3. Methods

<u>Introduction</u>

 The experiences of individuals who work on outdoor collaborative projects at schools, such as urban gardens, are useful in determining social capacity for orchards. Research outcomes may prove useful in developing programs that work towards the establishment of more urban orchards at Halifax schools. Enhancing the edible landscape would provide students with the educational benefit of being connected to the production of their food (Burke, 2005).

<u>Research Design & Considerations</u>

 In this case study, nine adult school leaders were interviewed to determine interest in the implementation of urban orchards on schools grounds at five schools in Halifax, both private and public. The goal was to understand staff and parent leaders' perspectives on potential benefits and challenges to the implementation of urban orchards at schools. I have been careful to keep my behaviour appropriate during interviews by only offering information when asked, using the interview script and prompts, and relying on un-biased responses to answers.

 School sites were selected purposively based on perceived biophysical capacity for fruit trees. A rapid observation of Halifax school grounds determined which schools would be contacted for interviews. The in-person interview technique was chosen due to its ability in yielding highly detailed data (Frey & Oishi, 1995). The technique is also likely to provide reliable data, for individuals are more likely respond to a question with a lie over the phone than they are in person (Frey & Oishi, 1995).

<u>*Determining Biophysical Capacity*</u>

 To determine the biophysical capacity for orchards on Halifax school grounds, it was necessary first to examine school grounds on the Halifax peninsula to determine if there was

sufficient space for even a few fruit trees. This was done through field visits before interview request letters were sent out. If there appeared to be some under-utilized green space on a school's grounds, the school was considered as a candidate for the study. Schools were selected at random from among the candidates and school leaders were contacted (See Appendix B: Recruitment Letter).

After the interviews I walked around the school grounds plotting trees as points and buildings/play areas as shapes on a printed map of the school ground. This was transferred to a high-resolution image. A data layer of school property boundaries was created using a geographic information system (GIS) (Appendix D). School boundaries, roads, and building outlines exist on areal images, and points representing areas where fruit trees could be planted were digitized onto the areal images as layers. The maps determine more precisely the biophysical capacity for some 68 fruit trees at five Halifax school grounds.

Determining Social Capacity

Interview questions were developed with the purpose of understanding to what degree school staff members and parent leaders are interested in having orchards at their schools (Appendix A). Questions regarding attitudes can be the most difficult to answer, but the best way to generate meaningful responses to these questions is through in-person interviews (Frey & Oishi, 1995). Interviews were designed to take no longer than an hour and were recorded using a handheld recording device. Interview questions were designed to be open-ended.

After meeting a participant on school grounds, he or she was introduced to the study and asked to read and sign the first section of the consent form (Appendix C). Interviews took place outdoors on the school grounds where participants work or where their children attend school.

Interviewees led me around the school grounds, pointing out areas where students play, existing outdoor green space, and areas where even a few fruit trees could be planted.

The walk-about interview technique has a proven ability to capture high-quality data (Joniken, Asikainen & Makinen, 2009). This ethnographic technique allows the interviewee to show the interviewer places deemed important in relation to the questions being asked (Joniken et al., 2009). A free flow of conversation allows the interviewer to obtain detailed data about experience and place (Joniken et al., 2009). Main questions and sub-questions were included in the interview script, although not all sub-questions were asked. The sub-questions were included as prompts to assist interviewees who may have provided less-detailed responses to primary questions, and to allow for transitions between questions (Appendix A). Other prompts included nodding, eye contact, and non-verbal cues (Frey & Oishi, 1995). It was important to find a common ground with participants, who often highly connections to nature and food production, without indicating a biased perspective.

After the interviews, participants had the option of signing the consent form to agree to have their quotes featured in the final report, assuming they agree with the context in which they are written (Appendix C). Afterwards, points and shapes were plotted onto paper maps and photos of the school grounds were taken using a digital camera. Interviews were transcribed into Word documents, stored securely on my computer's hard drive and backed up. Only my supervisor and I had access to these documents.

Analysis & Outputs

Data were analyzed to ascertain the apparent social capacity of schools in the Halifax peninsula to pursue the establishment of urban orchards. Interview responses were organized into categories, such as perceptions of what an urban orchard means, perceived barriers and benefits

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to implementation, and an "other" section which included critiques of the current education system and references to public policy. The final report will be made available to participants and they will be able to request amendments. It is important that participants agree with the context in which their direct quotes are used. Quotes are intertwined with interpretations and analysis in the results section (Creswell, 2009).

Limitations

The limitations of this study are geographic, since only schools on the Halifax peninsula were considered. In addition, only adult school leaders were included in this study and no youth were involved. The focus of the study was narrowed onto the single phenomenon of orchards on school grounds but other issues and concepts arose throughout the interview process based on the experiences of individuals.

4. Results & Discussion

Nine participants from five schools participated in this study. Interviews took place outdoors on school grounds, with participants leading me around school grounds indicating important spaces such as existing gardens and orchards, as well as areas where fruit trees could be planted (Appendix D). Research results indicate both substantial social and biophysical capacity for the planting of fruit trees and bushes on school grounds on the Halifax peninsula.

Urban Orchard Conceptualizations

There was a variety of conceptualizations of the term "urban orchard", but most participants envisioned public or communal ownership of a space where fruit trees grow. P1, a staff leader at School #1, had never heard the term used before but thought of an urban orchard as public space that could be a community asset. He saw possibility of private urban orchards, but thought it would make more sense for an urban orchard to be owned by an entire community,

and referred to Common Roots Urban Farm as a potential location for an urban orchard in

Halifax. P1 did not "know how our society or our culture comes to understand these things". P3

also thought of concentrated plantings in public spaces, and also referred to Common Roots

Urban Farm as a possible location. P3 thought a knowledge-sharing program would be helpful to

encourage tree care and promote community fruit gleaning so the trees are not viewed as singular

and privately owned. P4 envisioned an intensive, resourceful, and efficient use of small space,

where permaculture principles are integrated so that the urban orchard can contribute to the food

forest. To P4, permaculture means:

> "an ethical system of sustainable living, which would encompass the food production
> aspects but also that sort of resourcefulness, capacity-building piece, the community -
> building piece, and so it's not necessarily just that we're getting lots of food out of it but
> it's also about creating resilient individuals".

Other participants like P6 and P7 indicated areas of the city where public urban orchards could

be planted. P7 discussed an existing edible garden where Chebucto Road and Connaught Avenue

intersect. P6 had noticed underutilized green space on the Connaught Avenue boulevards from

Chebucto Road to Bayers Road as areas where fruit trees and other food crops could be planted.

Participants' conceptualizations of urban orchards coincide with Abernethy (1996), who

defined a community orchard as trees managed by and for local people. Gazibara (2011) defined

an urban orchard as one that provides opportunities for education, healthy eating, stewardship,

and income growth. Common Roots Urban Farm, located in central Halifax, was mentioned by

three participants as a possible space where citizens could plant and manage fruit trees to feed

the community. Common Roots invites community members to start a plot for a seasonal fee of

$30 and grow their own food in the city (Partners for Care, 2015). An orchard here would satisfy

the definition of fruit trees planted by and for local citizens. However, school grounds will likely

be the most effective location for fruit tree plantings due to substantial biophysical and social capacity at these sites.

Urban Food Production on Halifax School Grounds

All participants identified some form of outdoor collaborative project that had taken place on school grounds in their time at the school. All five schools had at least one raised garden bed on school grounds (Figures 1-3) where students are directly involved by choosing the plants, watering them, harvesting the food, and cooking using garden ingredients. P5 and P6 were excited to talk about the community garden on their school's grounds, which was built with the help of the Ecology Action Centre's Urban Garden Committee. P6 was sought out by the school as a parent volunteer to coordinate the school's gardening club, as administration was aware of his passion for gardening. Various vegetables are grown in four planters (Figure 3). Gardening club starts indoors, with P6 and a teacher talking to the students, ranging from grades-one-to-seven, about "different types of plants and what plants need to grow", building initial excitement. The students then choose the plants and start growing them inside to be transplanted outdoors once they are strong enough and the weather is appropriate. Some challenges include involving older students from grades seven, eight, and nine in the gardening club, who usually "have got something better to do". Students are typically highly engaged in gardening for thirty to forty-five minutes, after which they "start to get a little bit bored", according to P6. Some of the most exciting moments for P6 are when students eat the "gnarly" organic carrots they grew themselves, even though they don't look appetizing. When students get picked up they encourage their parents to get out their cars to see what they have been growing, increasing parent involvement.

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Figure 1. Raised Garden at School Ground #5

Figure 2. Raised Garden at School Ground #5

Figure 3. Raised Garden at School Ground #3

P7 is the parent leader of the environmental club at her child's school and has been

actively involved with the garden club for the past two years. The garden project at that school

was a product of the Green Schools program operated by Efficiency Nova Scotia (2013), which

reached out to the school asking if it would like to participate (Figure 4). School #4 is one of 139

Green Schools across Nova Scotia that commit to energy conservation, composting, reusing, and

recycling to lower their environmental footprint while encouraging students to become

"champions of sustainability" (Efficiency Nova Scotia, 2013). Green Schools has ensured the

accountability of staff and parent volunteers at School #4 by continuing to contact the school,

reminding them that since they agreed to participate they must actively engage in the program.

Green Schools sends project coordinators to the school to assist with the gardens and to facilitate

environmentally themed projects. Having access to this resource is a huge asset to P7, who finds

herself easily tired out when all of the responsibility to facilitate garden activities is left to her.

Running the school's environmental club is a time-consuming task requiring patience, as mostly

grade-threes are involved in the club, which meets twice a month. Project coordinators from Green Schools assist in keeping all the students attentive and engaged during sessions.

Figure 4. Raised Garden at School Ground #4

P7 fondly remembers the students' excitement two years ago when blueberry bushes were planted in front of the school and how she couldn't believe "how many children had never used a shovel" and how excited they were to dig into the ground and "see what was down there" (Figure 5). She also noted that the older students in grades five and six are not always interested in working on outdoor collaborative projects, echoing an issue observed by P6. Although School #4's environmental club is open to students in grades-one-to-six, there are no grade-six students involved this year. Older students do not want to be involved in groups where younger students outnumber them.

Figure 5. Blueberry Bush at School Ground #4

Two participants identified the garden at School #5 as an impressive collaborative project that has achieved major success in the years since it was established (Figures 1-2). Twenty-to-thirty families are involved in maintaining the garden, indicating that a strong volunteer commitment is necessary for collaborative projects to achieve long-term success. Parent volunteers also come to the garden "throughout the summer for watering, weeding, picnics, and then in the fall again", with their time commitments organized on a webpage created by a volunteer. P8 got involved with the garden seven years ago, although it was established fifteen years ago. In her experience, there have been "lean years (for volunteers) and then there's years with lots of volunteers". When P8's children arrived at the school seven years ago, oxen were brought in to plow the garden plots before planting. P8 has witnessed many shifts in the garden in her time at the school, and understands that "when you're a very small school it's easy because there's a strong sense of community but as we've become bigger it's harder to find the community". She thinks it is important to keep the garden a manageable size even as the school expands and interest increases.

The garden at School #5 receives financial assistance from a grant under the Our Food Project, which promotes local food initiatives. This grant allows the school to access "phenomenal" resources. P8 explains that "all sorts of different things" are grown including "potatoes, melons, watermelons, tomatoes, leeks, garlic, brussel sprouts, garlic, broccoli, cabbage, onions, cucumbers, herbs, lettuce, kale". In addition to growing food, the garden contains a rainwater catchment system, compost piles, a separate rhubarb patch, a pumpkin patch, and an herb garden. Each year students have the opportunity to plant, pick, explore and eat in the gardens, which "ties also into food security" (P8). Students from low-income families may get more vegetables at school than they do at home, thanks to the abundant garden. According to P8, "a lot of children that are involved in our breakfast program aren't getting a lot to eat, so if we have in this public space food that is readily available and safe, they can just harvest that". P8 seems most passionate about the experience of each grade-five class, which collaborates with special guest chefs each year using garden produce to create a meal for the entire student body and staff, an impressive 450. An important aspect of "what's going on here in the school, (is) just understanding food, preparing food".

The herb garden at School #5 is enjoyed by students in the Learning Centre, who have developmental challenges with sight, hearing, and/or cognitive development. Sensory exploration through touching, tasting, and smelling items like lemon balm, thyme, rosemary, and basil is a:

> "really important part of their day, coming out (and) being able to water, taste the stevia, the sensory side whether you want to call it a therapeutic or horticulture, it is a really, really nice way for those children to be able to come out and explore nature"(P8).

Similarly, at School #4, a plot of herbs was planted to encourage students with cognitive challenges to participate in gardening through sensory exploration.

Involving students in food production on school grounds can lead to an increased

connection to the natural world, allowing youth to overcome electronic attachments (Louv,

2005). Media advancements and increased use of technology obstruct the development of real

interpersonal relationships and interrupt an important period of identity formation for preteens

and teenagers (Brody, 2012). Technology also separates urban youth from natural environments.

Louv refers to a "third frontier" where youth are severed from involvement in food production

and have no memory of the "brutal aspects" of it (2005, p. 21). Youth involvement in planting,

harvesting, and cooking with fresh produce they grew themselves indicates Halifax youth at the

five schools interviewed do not suffer from a "nature-deficit disorder", as Louv suggests (2005,

p. 36). Understanding the experiences of school leaders who witness youth focused and engaged

in the garden, although those same students struggle in the classroom, is important because it

indicates that time spent in a school garden increases concentration and connection to food

sources.

Placing food production sites on school grounds contributes to the edible landscape,

which is a combination of "food, fresh air, and play" where students learn by doing (Burke,

2005, p. 579). Placing edible plants in urban landscapes enhances traditional landscape design

principles (Hatfield, 2009). Edible landscapes on school grounds could encourage older students

not interested in gardening projects to spend more time on school grounds. Older students are not

interested in participating in activities dominated by younger students. As they get older, their

concerns shift from their local environment towards global issues. Participants indicated that

starting in grade-seven youth become more concerned with social issues, which is supported by

Sobel (1996). P4 thinks high-school students at School #1 would benefit from an uplifted

outdoor space, such as an edible landscape or urban orchard, to provide more opportunities for them to learn about nature and to entice them to stay on school grounds during lunch and recess.

Collaborative Projects on Halifax School Grounds

Collaborative projects on school grounds include a Nova Scotia native species habitat that P5 initiated at School #4 (Figure 6). Tree Canada and FedEx helped with the funding and planting, and P5 and her students are responsible for upkeep and protection. When planting they had to consider the placement of underground geothermal wells. A challenge to this project has been encouraging students to direct their play away from the habitat and for them to understand how running into the young trees or hitting them with soccer balls negatively affects the growth. The outdoor habitat has fit into many of the school's rotating themes including Living Things and Nova Scotia.

Figure 6. Native Species Habitat on School Ground #3

Figure 7. Outdoor Classroom at School #4

At School #1, students made and sold rocket stones to fundraise for a solar panel and fan to accompany a heat lamp students made out of old soda cans with the help of a Dalhousie Engineering class. At the same school, a greenhouse was constructed by a grade-eleven class after receiving a $5,000 grant. The high-school students helped with the framing of the structure and other classes helped by shingling the greenhouse with cedar. The collaborative project relied on an invested group of students who were only able to enjoy it for a little over a year, leaving it as a legacy for other students. The greenhouse is still used for learning about plants by grades-two-to-twelve students at the school. When asked if a specific environmental club proposed the greenhouse project, P1 said:

> "nope, environment and sustainability (is) a major thread through our whole curriculum, we don't have a club for it, it's what we do, that's what we do. When we look at society, we talk about environment, when we look at literature we're talking about being stewards of a society and what does our culture mean, what is (the) inter-subjective meaning of who we are as a people, (which) includes how we look after ourselves and our environment, which is inextricably linked as part of ourselves. It is us. Environment is us".

The variety of outdoor collaborative projects on school grounds initiated by student, staff, and

parent leaders in Halifax indicate substantial social capacity for urban orchards.

Two schools have outdoor classrooms offering students a chance to learn outside and spend more time amongst nature. Both outdoor classrooms were funded, designed by, and built by parent volunteers. At School #4, the outdoor classroom has not been maintained in recent years and lacks seating, but parent volunteers intend to "freshen it up a little", "clean the trash out", and trim back the overgrown wisteria (Figure 7) (Appendix D). At School #2, dedicated parent volunteer P9 and her husband led a team of volunteers to build an outdoor classroom on school grounds after mounting concerns that students were not enjoying time spent outdoors at school (Appendix D). The wall of the school parallel to the classroom is painted with chalkboard paint and features Aspen, Maple and Oak leaves, representing the trees surrounding the school. P9 hopes the area will be planted with grasses and shrubs this year and maintained by parent volunteers in the future (Figure 7).

Any project requires at least one champion or "wise person" (ESSA Environmental and Social Systems Analysts Ltd., 1982, p. 36). The need to have a leader with expertise on fruit tree maintenance to see the project through from its initial stages until completion was cited as important by five participants. This wise person could be an individual from a non-governmental organization or a volunteer organization. He or she should be considered credible and respectable by other school leaders (Environment Canada, 1982). "Early adopters" are often considered credible as they are recognized in existing social systems, so this could be a neighbourhood expert who volunteers time to help staff, parent volunteers, and students maintain the fruit trees (Environment Canada, 1982, p. 36). Expertise and passion for outdoor collaborative projects exist amongst adult leaders at Halifax schools, but leaders prefer outside assistance and expertise when it comes to school orchards.

The native species habitat at School #4 proves that funding tree-related projects is not hard, as funding is easy to acquire from Tree Canada and other organizations interesting in increasing youth's connection to nature. Tree Canada (2014) provides grants to eligible applicants who want to increase access to healthy food, provide public access to fruit, and plan on planting in a geographically suitable environment.

A teacher at a Michigan school initiated project similar to the habitat at School #3, creating an outdoor classroom on school grounds from a small woodlot called the Dimondale Outdoor Discovery Center (Weise, 2012). The space inspires students to be stewards of nature and is a valuable resource for teachers who now integrate environmentally themed lessons into curriculum (Weise, 2012). Students have planted trees and other plants to which native pollinators are attracted (Weise, 2012). The place-based education opportunities of the Dimondale Outdoor Discovery Center, and outdoor collaborative projects at Halifax schools, connect learning with real-world experiences (Weise, 2012). Outdoor projects on school grounds that involve students in the planting while engaging them and encouraging them to get outside answer Louv's (2005) call to increase connections between youth and nature.

<u>Biophysical Capacity for Fruit Trees</u>

Four out of five schools had fruit trees or bushes planted on school grounds (Appendix D), although at no school is the fruit currently being harvested or consumed by staff and students. At three of the four schools, the fruit trees and bushes are still too young to bear fruit. At School #5 a twenty-year-old apple orchard with roughly 38 trees serves as a natural "active play area" for students behind the playground. The area is naturally cool in hot summer months, providing staff and students with a shaded orchard area. The fruit from this orchard is not being harvested, and P8 noted rotten fruit, bees, and wasps as the main nuisances of this orchard.

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Otherwise, the students at School #5 love playing amongst the large, fruit-bearing trees. P8 indicated that the school would like to develop a:

> "better method for harvesting, so we've been talking to arborists about coming in and trimming the trees so that we get the full potential, because these trees aren't growing properly right now. They're just growing as apple trees, but they should be trimmed, the top branches (should be) taken off, and grown as a proper orchard".

At the same school, a small orchard has been planted at the front of the school but trees are too young to bear fruit. More fruit trees were planted in the front of the school to divert wasps and bees away from the areas with children with allergies spend the most time at lunch and recess.

All study participants identified some areas where fruit trees could be planted on school grounds (Appendix D). Plantable spots were determined using the walk-about interview technique, with participants showing me areas where children often play, underutilized space, and vacant areas around existing school gardens. The most common locations indicated for possible fruit trees were around existing gardens, since those are the areas where students are currently involved in food production, as well as along the perimeter of school grounds where children do not often play. Some 68 plantable spots were identified at the five schools, indicating substantial biophysical capacity for urban orchard development on Halifax school grounds.

Planting fruit trees and bushes in underutilized areas on school grounds in Halifax would fulfill the recommendation of the Halifax urban orchard workshop to focus an urban orchard on youth and education (Lesko et al., 2014). Once trees and bushes bear fruit, they could also fulfill the recommendation that fruit be incorporated into existing school lunch programs to increase the consumption of fruit by youth (Lesko et al., 2014). Although results would not be immediate, incorporating more fruit into the diets of Halifax youth could work towards reducing the trend of childhood and adult obesity (Bates, 2014; Vital Signs, 2012).

Benefits of a School Orchard

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The following benefits were identified by participants when asked, "do you think there would be any benefits from involving students and staff and/or parents in an outdoor orchard project on school grounds"? Benefits are organized in order from those most prominent in the interviews to those mentioned only once or twice.

Teaching youth about their connection to and interdependence with the natural world was cited as a main benefit of urban orchards and gardens on school grounds. Experiential learning outside of the classroom can be very beneficial for youth. P1 thought that:

> "by putting a child's hands in the actual means of food production, they are really touching the very source of their own strength and vitality. That's what you're doing for them, you're really teaching them self-sufficiency, you're teaching them their interdependence with all things, obviously you're teaching them just plain old science, this is what it takes to make something grow and how to look after it and you have to care for it and you know, (it) gets them outside of their own self-involved, egotistical self and they start looking after things, and they experience the cycles of nature, you know, they experience the phases of the moon and the sun and they understand their life as being connected with those cycles and they notice changes in the environment and they become more aware of those changes and they become concerned naturally with climate change. If they've just got their head stuck in a screen the world could be burning around them, they wouldn't even know".

P5 also referred to the benefits she has seen youth gain from being involved in the native species ecosystem, which "kids can use…not just for play but for exploration and education". Parent leader P2 saw the "esoteric knowledge" of learning through experience as a possible benefit of an urban orchard. Similarly, P7 thought urban youth specifically would benefit from an urban orchard because "as parents a lot of the time we don't realize that the kids don't have the experience of picking and eating an apple off a tree unless they go to the valley, right? But there are a lot of kids that don't get out of the city so much". P5 could identify instances when youth benefited from direct experiences with nature outside of the classroom. It happens anytime she takes her students to her farm where, among other crops, fruit is grown. When asked what a benefit of an urban orchard could be, she responded:

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"we have a farm and the students go there quite frequently, whether it's to look at the geology of the Minas Basin or whether it's to look at the forests and then when they're there they tend to do work, whether it's stacking firewood or digging potatoes or washing plant pots and so they have a space to be at the farm. Sometimes it's just running through these open fields you know that students love to do (that) but they also participate in the farm work too which they love to do and…letting the kids be out there and watching them just be, just be...They're aware of the cycle of everything but actually just breathing in fresh air and running around in nature whether it's a beautiful day or raining".

Students who go to P5's farm actively engage in lessons that can be related to the curriculum and to school themes. Staff and parent leaders who have witnessed the benefits of experiential learning cite it as a major benefit of urban orchards.

Two parent volunteers from School #1 fondly remember a field trip the class took to Micou's Island in October 2014. The class walked in at low tide, exploring the beaches, tidal pools, and woodlands, but P3 remembers:

"the biggest learning perhaps came from that when it was time to leave. We misjudged the tide times a bit so we had to take off boots and roll up pants and carry little ones. Well they're (the students) never going to forget that it wasn't an island when they arrived and it was when they left. And so they will really know because they experienced with their whole body, you know, the changing of the tides and that it was an island when they left. They'll really never forget that. And it's a very different type of knowledge from something that's just told to you".

Experiential learning is very important to staff and parent leaders at School #1, where the environment is built into the school curriculum and students have a strong appreciation for the outdoors.

Existing urban gardens on school grounds give youth a chance to experiment with cooking, which was cited as a benefit by six participants. P2 recognizes that "cooking skills are lost in one generation, so if you had an orchard and you taught your kids how to can the pears, or freeze the pears, wouldn't that be amazing for everyone"? P5 also acknowledges that involvement in a school garden or orchard could lead to healthier diets for students, as "they'll try anything that they're growing themselves or cooking themselves". P6 agrees with this

sentiment, and has found that students who garden are more likely to eat gnarly, organic produce if they grow it themselves and pull it out of the ground than if they open their lunchboxes to find it. P6 thinks there would be room in the schools existing lunch program for fruit from a school orchard, since the program currently benefits from the garden produce.

At School #4, a yearly harvest gives students an opportunity to cook with food from the gardens. The students enjoy experimenting with herbs to create dips for the fresh vegetables as a healthy snack. According to P7, a "huge part of the environment club is eating and enjoying what we have in the garden, so they (the students) can't wait to find a carrot or peas or beans, and then they bring it in and eat it right up". The grade-fives at School #5 harvest food from the garden and produce food on a weekly basis including pizzas, wraps, and muffins. Cold-frame gardens on School #2's property are used to grow produce such as kale with the intention of students using the produce for cooking projects, but P9 wishes there were more cooking opportunities for students at School #2:

> "because even my son is interested in Master Chef Junior. I think grade-twos and grade-fours had a specific assignment within their classroom of what to do with the food, making kale chips and things like that. It would be nice to have that option along with other committees…(but) they have nothing here in the cooking area. Hopefully somebody takes the lead on that and creates a club so they (the students) can understand good food that they have grown. And the (fruit) trees would probably add to that because (that's) something they can easily put in a salad".

P9 imagines it would be easy to integrate cooking programs using food the students have grown themselves into existing science curriculum. Student involvement in gardening and orchard activities can lead to increased connection to food sources and provides opportunities for cooking with locally grown produce.

Some participants supported staff, student, and parent involvement in orchard planning as a benefit. According to P3 at School #1, being:

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"involved at the inception or idea level and also at the practical level of implementing it (is important) because it's that lacking piece, the carried-on care and maintenance for something, that often falls short and you're never going to get it if something is just done for the school or by a small group. You really need to try to expand the group so there (are) more owners so there's more energy to maintain it".

If the school is not actively involved in the planning and implementation piece, it is more likely that, with time, the initiators will lose interest and care and the outdoor collaborative project will falter. Therefore, a strong parent volunteer base and youth engagement would be necessary for an orchard project to be successful. P4 agrees that if students were engaged in all stages of planning, as they were with the school's greenhouse project, it would lead to an "increased sense of resourcefulness and resilience" and if youth could set "up a model for it, (it) would be kind of amazing". P4 advocates for the integration of "collaborative design" for the modeling of a "permaculture system".

These sentiments were shared by participants of Halifax's 2014 Urban Orchard Workshop, where many agreed that citizens care more about a project if they are engaged and physically a part of it (Lesko et.al., 2014). P5 agrees that if students, staff, and parent leaders work together as a group, "project-based learning" would mean the students would get to do the "researching, planning, and implementing" which would lead to furthering the education of "everybody in your community". Place-based education where students lead projects in their communities leads to a stronger sense of community and identity through the use of one's local environment (Switzer, 2014). All of the participants who cited hands-on learning through the planning and design process as a benefit to urban orchards have seen first-hand how this has benefited students based on past outdoor collaborative projects at their schools.

Some benefits were mentioned only once or twice by participants. P4 and P6 thought that an urban orchard could provide more opportunities for parents to visit school grounds. Students

pointing trees and fruit out to parents, stating proudly "I grew that" creates a sense of accomplishment (Hatfield, 2009, p. 8). P4 thought having an orchard would increase the possibility of outdoor staff meetings. P6 saw an orchard as a potential "initiative builder" for parents and something that could be easily integrated into School #3's existing policies and initiatives.

Place-based educational opportunities are emerging worldwide, offering students a chance to connect real-world experiences to curriculum standards while developing strong relationships to the natural world (Campbell & Spaulding, 2010; Switzer, 2014; Weise, 2012). Place-based education uses local environments to teach language arts, math, science, and social studies, requiring staff and students to exit the building and learn from the world around them (Sobel, 1996). Students establish their sense of place within their local communities through place-based learning (Switzer, 2014). Adults often attribute their strong environmental attitudes with time spent in wild or semi-wild environments in their youth (Sobel, 1996). When children respond to the natural world sympathetically, they remember those experiences and as adults have a moral relationship with the world and are more likely to act with kindness (Chawla, 2002). First-hand experiences reinforce memories of subjects, leading to better test performances (Skelley et al., 2007). Youth in urban environments can achieve strong environmental attitudes by spending time in "explorable landscapes", bonding with the earth by making forts, gardening, or caring for the land (Sobel, 1996, p. 3). Students at all of the schools where interviews were conducted are involved in at least one of these activities year round, indicating that strong environmental attitudes could be developing in the students already.

Barriers to Implementation

The following barriers were identified by participants when asked, "can you identify any challenges/barriers to the development of the project of urban orchard development"? The barriers to establishment of urban orchards on school grounds are organized from those that were most prominent in the interviews to those mentioned only once or twice.

One barrier identified by three participants was that young, vulnerable fruit trees planted on small school grounds where play-space is already limited could restrict students from imaginative, free play. P1 was concerned than an urban orchard could be hard to implement due to space constraints and was concerned that natural play might become limited. An orchard on school grounds might take away from student's "developmentally appropriate and healthy rambunctious, rapscallions running around and knocking stuff over by accident". P6 agrees with this, citing that the biggest "challenge would be to keep the trees safe long enough for them to develop large enough roots and tree tops to handle the kids banging into them with soccer balls". Students would need to be educated on the vulnerability of young trees, which could be incorporated into current science curriculum.

Imaginative play allows children to mentally modify the surrounding environments, so play areas should be designed with that in mind, allowing students to play without restrictions (Barnett & Kruidenier, 1981). For young children, play can help to overcome trauma, allowing them to work through feelings (Brody, 2012). Through play, children learn how things work through task completion and repetition (Brody, 2012). In the native pollinator garden at School #5, installed in conjunction with the Ecology Action Centre, small paths exist for children to travel through. Amongst butterfly-attracting plants such as milkweed, a student built a fort (which P8 interpreted as a fairy home), and has collected brush and other natural materials for the "inhabitants" use. School #5, along with other participating schools, thinks it is important

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that students have natural play-spaces and not just human-made play structures. The type of imaginative play evident School #5 relates to the genesis of place attachment in which children can form special bonds with trees that they carry with them for life (Chawla, 2015). This "magic union," is important to early childhood development, although often dismissed by researchers, because it "implies a self-aware coming together of self and other" (Chawla, 2002, p. 209). Benefits from nature include increased environmental reasoning and knowledge, but the benefits of "just being in" nature with "a secure attentiveness" should not be discounted to make room for more measurable benefits (Chawla, 2002, p. 213). Participants agree with the view that being in nature has many benefits, such as increased mindfulness.

Other barriers identified by staff and parent leaders included "space, money, and time". P3 thinks tree planting and care would be relatively easy, but is concerned about space constraints at School #1 as much of the school ground has been paved for parking. Finding space for a school orchard committee to meet might be difficult, since so many other committees already exist at the schools. P9 is concerned with the dangers trees might pose to students and community members, as low hanging branches could be hazardous where playing students, not watching where they are going, could run into them. Lower branches would need to be properly pruned so students don't get hit, but time constraints might prevent this type of tree care. This problem could be mitigated by placing decorative fences around the trees so students are aware of their surroundings, according to P9. P9 was also concerned about fallen fruit and would not want to see "rotting fruit on the ground". P7 is not always comfortable eating food out of a public garden since animals might urinate on crops, so she would be concerned about eating fruit off bushes and low-lying tree branches. Poor soil on the grounds of School #3 was a huge issue for staff leader P5 when she initiated the planting of the native species habitat, so she is

concerned about planting fruit trees on that same poor soil. New soil would need to be brought in. P4 thinks care and maintenance would be an issue, as trees would have to be wrapped during inclement weather. At School #1, "adoption is a little challenging; any time there's change it's a big, big deal". Staff and parent leaders involved in orchard planning might be invested, but once those people move on, the challenge is encouraging other staff members and parents to take over leadership.

<u>Assistance Required</u>

Based on their experience with school gardens and other outdoor projects, staff and parent leaders realize that although such projects elicit excitement and passion in many students, adult school leaders often end up with the bulk of the responsibility. For school orchards, both staff and parent leaders said they would benefit from receiving training for aspects of fruit free care such as pruning. P4 thought professional development days when students are not at school would be a good time for outsiders to come in and teach staff about orchard care. These outsiders could come back regularly to check in with staff and make sure the trees are healthy. P7, on the other hand, thinks teachers are too busy to take on the responsibility and that teachers would appreciate parent volunteers planning and maintaining the orchards. P9 agreed that parent volunteers would "need to be involved to maintain" any project on school grounds. Her role in transforming School #2's playground from a barren expanse of pavement to a child's paradise featuring a new play structure, an outdoor classroom, a small orchard, gardens, and a basketball court, affirm that parent leadership is needed for school ground projects to be successful in the long-term (Appendix D: School Ground #2). P9's continued role in improving the school's upper playground, even as her child nears graduation, is an example of the excellent work dedicated champions are capable of doing.

Dedicated parent leaders at all participating schools act as champions, leading students in outdoor projects that have many direct benefits. P8 notes the importance of outside expertise but humbly fails to acknowledge her role as a champion in the school garden project at School #5. She insists that "we're not experts, we're parents" but has provided assistance not only to School #5 but also to School #4 when it started its garden project. P8 operated a small business helping schools and individuals begin garden projects, and P7 spoke highly of the assistance and leadership she provided to School #4. P8's assistance and gardening expertise relieved some of the pressure that P7 felt from being so passionately involved with the garden in its initial stage. P6 was also sought out by School #3 and selected to be the leader of the gardening club by school staff, who saw him as the best candidate based on his knowledge and experience.

School Leaders Attitudes Toward School-Based Orchards

Eight participants agreed and one partially agreed to the last question; "what do you think about this statement: youth will be important in maintaining a sustainable urban orchard in Halifax. Education, community outreach and increased connection to food sources could result from the development of urban orchards". P4 immediately stated that "yes, I think instead of important, it's crucial". P3 also agreed, saying that:

> "any sort of sustainable food movement really needs youth involved. Even just the word sustainable doesn't that sort of…automatically mean it needs to carry on through generations, and we certainly do have city youth that grow up without a direct connection to food and its source and just whatever we can do to change that is really important. I love seeing children have a connection with where their food comes from".

The direct connection to food sources and nature that youth gain from being involved in food production was the greatest benefit identified by participants. P3 also thinks that knowing where food comes from will lead to more mindfulness about the energy it takes for food to make it to

table. "This (is a) way of thinking that you might not otherwise ignite without that direct connection" of knowing where one's food comes from.

Some participants had creative ideas for collaborating with other community members to sustain an urban orchard in Halifax. These collaborations would benefit schools that identified space and time commitments as barriers to orchard implementation. P4 thought that "senior citizens could be fantastic allies here and they could get some real ownership of the space between youth and senior citizens" at School #1. P4 is aware of the many hospitals and seniors care centres in School #1's neighbourhood, and referred to the wealth of knowledge and experience around orchard maintenance that many of those individuals might be willing to share with youth. When P1 responded to the last question, he said that his "first thought was actually youth at risk" who could protect the trees. A community orchard could be planted around Uniacke Square, involving youth from the In My Own Voice (iMOVEe) project. iMOVe works with local youth who want to have a positive impact on their local environment, encouraging them to take action in creative ways (In My Own Voice, n.d.). An urban orchard partnership with iMOVe could lead to "a connection between that empowerment initiative and growing food in orchards and the kids being really given the responsibility of looking after these things"(P1). Urban orchards on school grounds would have many benefits, but those same benefits could be achieved by planting orchards near senior centres or not-for-profits that support urban youth at risk.

The skills and lessons students could gain from being involved in an orchard would be transcendent; they would remember them for years to come. P9 agreed that youth would be important in sustaining an urban orchard because when they learn about the environment in a hands-on way, "they care more about it and they bring it home and they end up teaching the

parents". P6 "100%" agreed with the last question, saying that "if we give them (students) the opportunity and show them how to do it, then they will know and they'll teach their kids". Parents will notice the benefits in other ways as well, and parents of students who work in the garden at P7's school "say they never eat anything green (at home) and they can't get enough and they just want to eat it raw and they're so excited about eating healthy food" when they bring home produce from the garden. P5 agrees that youth will "try anything that they're growing themselves or cooking themselves". P8 agrees that an urban orchard makes sense because getting such programs into schools could address the issue of childhood obesity in the province. Urban gardens and orchards allow youth to be "healthy and active kids", and "having these structured program where we can get that healthy food into our schools, into our snack programs, low cost, I think it just makes sense". Food production sites on school grounds encourage youth to eat healthier, and their parents notice their lifestyles becoming healthier.

Attitudinal Shift

The benefits of exposure to nature in early childhood development are often forgotten because standards for learning outcomes are emphasized more often. These standards are evaluated through testing, and students in Nova Scotia repeatedly perform at a lower level than other Canadian students in areas of math, science, and reading (Government of Nova Scotia, 2014). The obvious reaction is to increase classroom time dedicated to these subjects, but this reaction does not consider that math can be taught through gardening and orchard maintenance, which was mentioned by P7. Increased classroom time around testing season stresses teachers and parents, especially those within the public school system. At School #1:

> "we have kids from 9:00 until 3:00 and if you have plant(ing)s that you want kids to be involved in…it takes time and so you have to have a public that really values these things. And a lot of times people get very fear-based and they feel like all of these things are kind

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of extras. They're nice, and yes of course they would be good given enough time, (but) make sure my kid can read and write and can do arithmetic, and then you know, go and water some fruit trees and pick the apples and make apple sauce".

P1 is no stranger to the bad news stories that paint the province as an educational laggard. The current system focuses on outcomes such as reading and writing because they are easy to measure through standardized testing. Therefore non-measurable skills do not get taught simply because they do not get measured, and "because it doesn't get taught, it cuts out the whole atmosphere of richness and beauty and inspiration as part of education. And it dumbs the whole thing down to this really almost degraded, stupid level" (P1). Non-measurable skills include mindfulness, inspiration, and engagement. P2 is concerned that these skills are not measured, and thinks the focus should shift from education standards of writing, math, and science towards a mindset of what is means to have a valuable life. An attitude shift of what education is would allow for non-measurable skills to be taught through place-based learning. If more non-measurable skills are taught, more students would have a chance to thrive.

P5 feels unconstrained by "government imposed curriculum outcomes" and is glad she teaches at a school where many important areas get covered through theme-based learning. She realizes that:

> "economics and history and language and math and all those sorts of things are tied together and so something like planting a garden does incorporate all those things and looking at social issues behind that and it's not just this is a seed and this is the science behind how a seed grows you know it's beyond science to writing…stories and making speeches and writing protest songs".

Other school leaders are concerned that this type of learning is easily forgotten. Students might only have the opportunity to connect with the natural world at school if that is what the public wants to see. For school orchards to be sustained over the long term, a shift in attitudes about

education is necessary. In fact, the "whole notion of education might need to change" according to P2.

The Government of Nova Scotia conducted a comprehensive review of the public school system and discovered that 50% of parents with children in public school are dissatisfied with the system (Minister's Panel on Education, 2014). The report emphasizes that math and reading skills are essential to create individuals ready to enter the workforce (Minister's Panel on Education, 2014). P1 calls these skills the "lists of outcomes that we feel are necessary to create an employable human being". The report admits that the current system of education may need to change because students in the same grade do not always work at the same pace, resulting in multiple outcomes from students in each grade level (Minister's Panel on Education, 2014). The report does not consider the benefits and learning opportunities students gain when they learn outside of the classroom.

Place-based learning complements traditional learning strategies by providing an alternative to classroom learning for students who work at different paces (Cheng & Mattor, 2010). P7 has witnessed students who are unfocussed in the classroom become more attentive and mindful in the garden. Similarly, P2 practiced experiential learning with her daughter when she was homeschooled, and saw the many ways it benefitted her early education through free play, exploration, and inquisitive problem-solving. P2 thinks a school orchard would benefit many students because:

> "if you just sit with that tree and watch it through the season, not only have you learned a ton about science and trees, you have a relationship with it, you've learned how to be attentive and mindful, which are great skills for leaders, you know you can see how one tree could change a school. And then you have fruit which you could hand out to everyone."

She does not think it would be hard to quantify the benefits of learning from nature, and refers to the many studies that have been conducted on the positive effects of mindfulness, which is a thread throughout the curriculum at School #1, especially in the primary years before standardized testing begins.

5. Conclusion

Youth involvement in food production defies the popular hypothesis that urban youth suffer from a nature-deficit disorder. At five Halifax school grounds, students are immersed in the natural world, connected to their food sources through the planting and harvesting of food. Orchards could be used as educational tools connecting urban youth to the natural world while educating them about the process of food production. All schools that participated in this study have space for fruit trees on school grounds. A strong volunteer commitment would be needed to sustain school-ground orchards, which is easy to find at schools with existing outdoor collaborative projects. All schools could easily marshal the teacher, parent, and pupil resources to establish and maintain at least a few fruit trees on school grounds. One or two outside experts would be highly valued by adult school leaders. These experts could provide free training in areas of fruit tree planting, pruning, watering, other maintenance areas, as well as harvesting of fruit. Adult school leaders could then teach these skills to students, who would maintain a sense of leadership and ownership over the orchards, ensuring long-term sustainability. The costs of implementing a school orchard - financial as well as time investment - are not substantial, but are greatly overshadowed by the benefits of school-ground orchards. Advocates for school-ground orchards know their benefits, which are wide-ranging and can be profound for student development. Benefits of school-ground orchards include increased connection to the natural

world and to food sources, increased fruit consumption by a population group at risk of obesity, mindfulness, and imaginative play.

The research outcomes shared here should be considered at future Halifax urban orchard workshops and in the Mayor's Conversations on Healthy and Livable Communities. Mayor Mike Savage proposed an urban orchard pilot project because he thought it would benefit Halifax residents. Placing orchards on school grounds would give youth opportunities to grow healthy fruit for their school community, sharing their skills and enthusiasm with parents and other community members. Further research should be conducted to determine the sustainability of the small orchards currently planted on Halifax school grounds. The trees should be observed yearly to determine if school leaders and students are pruning, watering, and harvesting the fruit. In three to five years, School grounds #2 and #5, whose fruit trees are not yet bearing fruit, could be closely examined to determine how the harvested fruit is being used. Assuming those involved in maintaining the orchard view the project as a success, Schools #2 and #5 could be used as model for what a sustainable school orchard should look like. Positive outcomes from these orchards would then lead to increasing fruit tree concentrations on school grounds, where there exists substantial social and biophysical capacity for fruit trees.

When considering a location for Halifax's urban orchard, those initiating the pilot project should look first to schools, where there is abundant enthusiasm for place-based learning and local food production. In addition, the champions of Halifax's urban orchard pilot project should not only consider the experiences of adult school leaders who have facilitated school-based garden projects, but also incorporate those individuals into the planning process of any orchard development. Halifax leaders are not far from the tree in assuming an urban orchard would benefit residents. However, developers of a sustainable urban orchard must heed the advice of

current champions of outdoor collaborative projects while tapping into the substantial social and

biophysical capacity that exist on Halifax school grounds.

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7. Appendices
Appendix A: Interview Schedule

Prior to the interview, participants will read and sign the informed consent form. Both the researcher and the participant will turn on and test the audio recording devices worn around our necks. We will begin by walking outside on the school grounds, and throughout the interview I will ask participants to point out existing outdoor green spaces such as urban gardens and play areas where new trees should not be planted. I will also ask them to point out underutilized green space where even a few fruit trees could be planted. This will be jotted down onto a paper map.

1. Have there ever been any collaborative, outdoor projects at this school?

>
> Yes: Can you tell me about them?
> Who was the leader?
> If the project is ongoing, who maintains it now?
> Did/do the project/s have any environmental themes?
> If so, what are/were they?
> Could you tell me about what you think students have gained from being involved in this sort of project?
> Ask to see the sites.
> Does this project give students a sense of leadership, and greater connection to nature,
> Develop skills such as teamwork?
> Who maintains it in the summer?
>
> No: Do you think something like that may interest students at this school?
> Was there no interest, lack or space, or any other restrictions?
> Other restrictions may include: unwilling staff leader, lack of staff or financial resources, no time.

2. Does your school have an environmental or green club?

>
> Yes: Is it run by students, staff or parents?
> How many are involved?
> Could you tell me about a success this group has had and how it happened?
> Has this group faced any challenges or barriers to success?
>
> No: Has anyone ever tried to start something like this, but it wasn't successful?
> Would you say there is little to no student interest for a group like this?

3. When I say 'urban orchard' what comes to mind?

>
> Could be even a few fruit trees
> Community building, food production by community and for community?
> An educational opportunity?

4. Are you aware of Mayor Mike Savage's initiative to promote an edible landscape in Halifax through the creation of urban orchards around the city?

    Council is concerned that youth are not active, obesity a growing problem.
    Spend a lot of time sitting indoors, ask if they imagine any benefits of outdoor education opportunities.

5. Do you think there would be any benefits from involving students and staff and/or parents in an outdoor orchard project on school grounds?

    What would those benefits be? Growing/distribution of food?
    What role do you imagine students having in the development and maintenance of an orchard?
    Leadership, working towards a goal, teamwork, collaboration?
    Connection to curriculum?
    Do you think students would be excited about this project in the first three years, before the trees bear fruit?
    What about graduating students, who have the greatest leadership role within the school but will never get to enjoy the fruits?

6. What assistance would students, staff and parents need for a project like this to be successful?

    What would be needed to get the project started? Outside expertise, someone with knowledge coming in and showing how to plant trees? Funding?
    Do you think there would be high or low levels of student willingness and excitement?
    Would orchard participation be capped, only students who have completed class work would get time in the orchard?

7. Can you identify any challenges/barriers to the development of this project?

    Administration? A willing staff and student body? Lack of available green space?
    What about summer maintenance?
    Do you foresee any risks, such as orchard vandalism?

8. What do you think about this statement: youth will be important in maintaining a sustainable urban orchard in Halifax. Education, community outreach and increased connection to food sources could result from the development of urban orchards.
Thank participants and have them sign the last section of the consent form, which indicates whether or not they give me permission to use direct quotes. I will inform the participant that should I use a direct quote they will be able to see it written in its context, correct errors, and decide if they want it to be used or not.

Appendix B: Recruitment Letter

Project Title: Investigation of the Social Capacity for Urban Orchards at Halifax School Grounds

Good Morning,

You are invited to take part in a research study being conducted by me, Kendra Marshman, a Dalhousie University student. The purpose of this study is to find out the level of interest among school leaders, such as staff members and parents, in the development of urban orchards on Halifax school grounds. Ten schools on the Halifax peninsula will be considered, and two representatives from each school will be interviewed. One will be a staff member (teacher, principal, vice-principal or grounds person) and the other a parent leader. Interviews will at most take up to an hour. They will take place outdoors on school grounds and will involve you walking around outside with me answering questions as well as pointing out areas where even a few fruit trees could be planted. You will be asked to wear a recording device for the duration of the interview.

In January 2014, Mayor Mike Savage endorsed a motion to develop an urban orchard pilot project to increase the edible landscape within Halifax. At a recent urban orchard workshop held at Dalhousie University in June 2014, participants agreed that education and community engagement would be most important aspects in ensuring the development of sustainable urban orchards. This study will be useful for understanding staff and parent leaders' perspectives on potential benefits and challenges to the implementation of urban orchards at schools. Research outcomes may also be used to develop programs that work towards implementation of urban orchards at Halifax schools.

If you have any questions about this study feel free to contact me at 226-373-2878 or k.a.marshman@gmail.com. You may also contact my research advisor, professor Peter Duinker, with any questions at peter.duinker@dal.ca or 902-494-7100. If you wish to participate by volunteering at most an hour of your time, please respond to this email and select the best time for you: before 11:00 AM Wednesday, Thursday and Friday or anytime on Monday or Tuesday. Interviews will be taking place from late October until early December, so please feel free to select any day and time that works best for you.

Thank you very much for considering participation in this study.

Kendra Marshman
Dalhousie University Environment Sustainability & Society Honours Student
226-373-2878

DALHOUSIE
UNIVERSITY
Inspiring Minds

Consent Form

Project Title: Investigation of the Social Capacity for Urban Orchards at Halifax School Grounds

We invite you to take part in a research study being conducted by Kendra Marshman who is a student at Dalhousie University, as part of her Environment, Sustainability & Society Honours project. Taking part in the research is up to you and you can leave the study at any time. There will be no impact on you if you decide not to participate in the research. The information below tells you about what you will be asked to do and about any benefit, risk, or discomfort that you might experience. You should discuss any questions you have about this study with Kendra Marshman (226-373-2878, k.a.marshman@gmail.com).

Who Is Conducting the Research Study

Kendra Marshman is the principal investigator and she will be supervised by Professor Peter Duinker School for Resource and Environmental Studies.

Purpose and Outline of the Research Study

This research examines the level of interest among staff and parent leaders in the development of urban orchards on Halifax school grounds. Ten schools on the Halifax peninsula will be considered, and two representatives from each school will be interviewed. One will be a staff member and the other a parent leader. In January 2014, Mayor Mike Savage endorsed a motion to develop an urban orchard pilot project to increase the edible landscape within Halifax Regional Municipality (HRM). At an Urban Orchard Workshop held at Dalhousie University in June 2014, participants agreed that education and community engagement would be most important aspects in ensuring the development of sustainable urban orchards. This study will be useful for understanding staff and parent leaders' perspectives on potential benefits and challenges to the implementation of urban orchards at schools. Research outcomes may also be used to develop programs that work towards implementation of urban orchards at Halifax schools. This could enhance the edible landscape, providing students with the educational benefit of being connected to the production of their food.

Interviews will take place at ten schools in Halifax. At each school, a staff member and a parent leader will be interviewed. A total of 20 participants are needed for this study.

Who Can Participate in the Research Study

Participants in this study must be over the age of 18 and give written consent to be interviewed. Participants must also be either a staff member at a Halifax school or a parent of at least one student at a Halifax school.

What You Will Be Asked to Do

To help us understand how interested you are in urban orchards on school grounds, we will ask you a series of questions. The questions will be asked during an outdoor interview, where the researcher, Kendra Marshman, will ask you to show her around the school green space and identify any areas where even a few fruit trees could be planted. The interviews will take place at the schools where either you work or your child/children attend/s. Participants will not be required to answer any questions that make them uncomfortable. Participants will be asked to participate in one interview lasting up to an hour. Participants will be asked to wear an audio recording device around their necks for the duration of the interview. Follow-up contact may occur if the researcher wishes to use a participants quote in the final report. Participants will be able to view the quote in its written context, correct errors and deny the quotes appearance in the report. This research study will be ongoing until late April 2014.

Possible Benefits, Risks and Discomforts

There are no direct benefits of participating in this study. Although participating in this study may not benefit you directly, your interview responses may contribute to knowledge that will benefit others. Indirect benefits stemming from this may be the implementation of orchards on schools grounds in Halifax, where students, parents and/or teachers plant, harvest and maintain the fruit trees to provide students and staff with healthy fruits and nuts.

There is minimal risk associated with this study.

Compensation / Reimbursement

Participants will not be compensated for their participation in this study.

Privacy and Confidentiality

Information that you provide to us will be kept private. Only the researcher, Kendra Marshman, and her supervisor Peter Duinker, will have access to this information. We will describe and share our findings in public presentation and report for the Dalhousie Sustainability Honours class. There is potential for report content to be used in a journal paper. We will be very careful not to identify any participant. This means that *you will not be identified in any way in our reports*. The people who work with your information have special training and have an obligation to keep all research information private. Also, we will use a participant number (not your name) in all written and computerized records so that the information we have about you contains no names. Participants will be able to view any quotes used in the report within its written context and will be able to correct errors and deny the quotes appearance in the report. All your identifying information will be kept in a separate file, in a locked cabinet, in a locked room. All electronic records will be kept secure in a password-protected, encrypted file on the researcher's personal computer.

Anonymity cannot be protected since the researcher will know the identity of participants. Participants will not be identified in any reports or publications.

If You Decide to Stop Participating

You are free to leave the study at any time. If you decide to stop participating at any point in the study,

you can also decide whether you want any of the information that you have contributed up to that point to be removed or if you will allow us to use that information. You can also decide for up to six months if you want us to remove your data. After that time, it will become impossible for us to remove it because it will already be analyzed

How to Obtain Results

We will provide you with a short description of results when the study is finished. No individual results will be provided. You can obtain these results by including your contact information at the end of the signature page. Results will be provided by email should participant wish to view them.

Questions

We are happy to talk with you about any questions or concerns you may have about your participation in this research study. Please contact Kendra Marshman (at 226-373-2878, k.a.marshman@gmail.com) or Peter Duinker (at 902 494-7100, peter.duinker@dal.ca) at any time with questions, comments, or concerns about the research study. We will also tell you if any new information comes up that could affect your decision to participate.

If you have any ethical concerns about your participation in this research, you may also contact Catherine Connors, Director, Research Ethics, Dalhousie University at (902) 494-1462, or email: ethics@dal.ca.

Thank you very much for you participation in this research study.

Signature Page

Project Title: Investigation of the Social Capacity for Urban Orchards at Halifax School Grounds

"I have read the explanation about this study. I have been given the opportunity to discuss it and my questions have been answered to my satisfaction. I agree to take part in this study. However I realize that my participation is voluntary and that I am free to withdraw from the study at any time."

I agree that the researcher may audio-record the interview with me   Yes ☐   No ☐

I give the researcher permission to re-contact me for future phases of research Yes ☐   No ☐

Name of Participant: _____   Name of Researcher: _____

Signature of Participant: _____   Signature of Researcher: _____

    Date: _____   Date: _____

I agree that the research can use substantial direct quotes   Yes ☐   No ☐
(Confirmed after interview)

Name of Participant: _____Name of Researcher: _____

Signature of Participant: _____Signature of Researcher: _____

    Date: _____   Date: _____
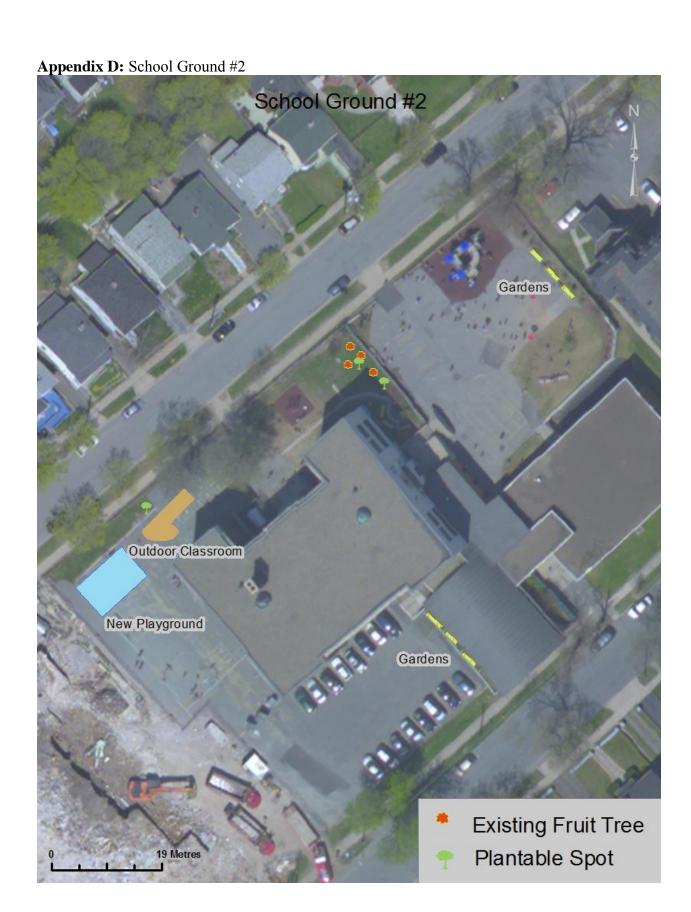
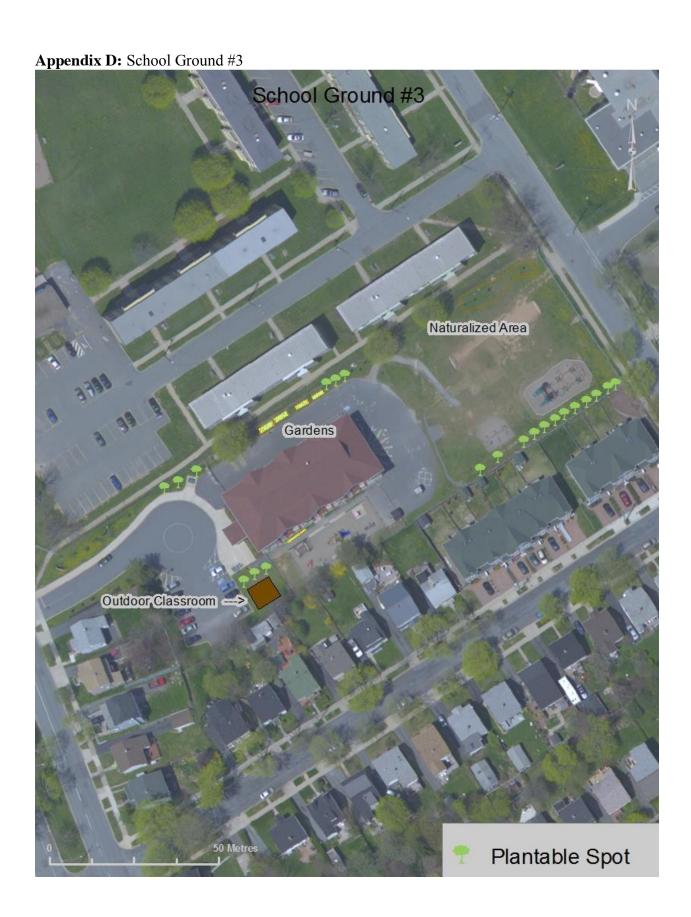If you wish to receive information on the study once it is complete, please provide a full address and a contact email below:

Appendix D: School Ground #1

School Ground #1

Naturalized Area

Garden

Greenhouse

0 12 Metres

Plantable Spot

Appendix D: School Ground #2

School Ground #2

Gardens

Gardens

Outdoor Classroom

New Playground

0   19 Metres

* Existing Fruit Tree

🌳 Plantable Spot

Appendix D: School Ground #3

School Ground #3

Naturalized Area

Gardens

Outdoor Classroom --->

0   50 Metres

Plantable Spot

Appendix D: School Ground #4

School Ground #5