Abstract

By encouraging direct experiences with the environment, the Museum of Natural History, in Halifax, Nova Scotia, has an opportunity to increase visitors’ understanding and appreciation of the natural world. A new public program, *Exploring Your Extraordinary Surroundings (EYES)* is being developed that is intended to encourage visitors to explore local natural environments and share their observations with the Museum. Designed to expand the scope of the Museum’s interpretative programming, this new program included an onsite component set in the Nature Lab, and an opportunity to interact with visitors through social media. A preliminary formative evaluation, employing a mixed methods approach, was conducted to assess the effectiveness of the program and the suitability of the Nature Lab as a programming space. Through an online survey and program observations, it was determined that visitors would be interested in this type of nature observation program, and the Museum should proceed with further development.

*Keywords:* nature, museum, evaluation, public program, natural history, programming space
FORMATIVE EVALUATION OF A MUSEUM PUBLIC PROGRAM

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Chapter One: Introduction

The Opportunity

Natural history is the practice where human experience links to the natural world through encounters and observations (Tallmadge, 2011). Introducing visitors to Nova Scotia’s rich natural history heritage, fostering their appreciation of the natural world, and increasing their understanding of our connection to nature is the mandate of the Museum of Natural History (Nova Scotia Museum, 2009). As human disconnection from nature grows, due to the increase of technology and urban lifestyle, fulfillment of this mandate can benefit human health and potentially lead to increased support for nature conservation (Louv, 2005).

In 2009, the Museum of Natural History began the process of renovating its galleries and updating its interpretative programs to better serve its visitors, and to better achieve its mandate. With the creation of a new potential programming space, the Nature Lab, the Museum has an opportunity to develop a public program that will provide direct experiences with nature and encourage an interest in the natural world. A nature observation program such as the Nature Exchange, which was suggested by the Interpretative Master Plan (Nova Scotia Museum, 2009), provides hands-on nature experiences that have the potential to help reconnect visitors with nature and make natural history practices relevant in their lives (Kolan & Polman, 2009).

Role of the Museum of Natural History. The Museum of Natural History is part of a family of 27 other Nova Scotia Museum sites that share responsibility for interpreting the province’s natural and cultural heritage; this decentralized system is unique in Canada (Nova Scotia Museum, 2009). Located in the provincial capital of Halifax, the Museum of Natural History receives more visitors than the other sites, achieving over 75% of museum visits in this province, with the majority of these visitors being from Nova Scotia (Nova Scotia Museum,
The Interpretive Master Plan, which was published by the Nova Scotia Museum in 2009, identified potential interpretative opportunities for each of the sites, including the Museum of Natural History (Nova Scotia Museum, 2009). Additionally, the plan encouraged Nova Scotia’s museums to proactively use their mandates in the development of interpretative products and experiences, along with best interpretation practices (Nova Scotia Museum, 2009). Museums are encouraged to offer meaningful experiences that will not only make natural and cultural heritage relevant, but enrich the visitors’ experiences through engagement with information, objects, and stories (Nova Scotia Museum, 2009). Today, museums are competing for public leisure time with many other types of entertainment and educational opportunities (Burton, Louviere, & Young, 2009). Thus, museums need to maintain their relevancy, understand the changing audience expectations, attract new audiences and encourage repeat attendance (Nova Scotia Museum, 2009).

With more diverse landscapes and habitats packed into its 55,000 km², than other comparable areas in Canada (Nova Scotia Museum of Natural History, 1997), Nova Scotia has a wealth of natural history stories to share. The Interpretive Master Plan advised the Museum of Natural History to develop interpretative programs that would help the public gain a better understanding of the province’s diverse natural history which could lead to appreciation and acceptance of personal responsibility for its protection (Nova Scotia Museum, 2009). Long-term programs, such as the Nature Exchange, were recommended; these programs would have the potential to grow over time and encourage regular participation by visitors (Nova Scotia Museum, 2009). To meet the needs of current audiences, the Interpretative Master Plan recommends that programs need to incorporate more active learning that includes: hands-on, experimental, and participatory activities that reflect their audiences’ interests. In addition,
programs should connect participants to the real world and to the museum by utilizing new communication technologies that promote social networking and two-way communication (Nova Scotia Museum, 2009). The Museum of Natural History has an opportunity to become more than just a physical space but to also reach their audiences where these people live, thus becoming an integral part of the community (Nova Scotia Museum, 2009).

**Nature Exchange.** First started in 1984, the Nature Exchange is a unique learning place where visitors trade natural items and share information about these items (Science North, 2013, Nature Exchange section). Developed by Science North in Sudbury, Ontario, the Nature Exchange program provides visitors with the opportunity to learn to observe, to ask questions and think independently (Barriault, 2001). Visitors are encouraged to collect specimens from nature (i.e. rock, shells, and acorns) and bring them to the Nature Exchange Center; this exhibit space contains observation equipment, information resources and access to knowledgeable staff. In addition to the item’s uniqueness, visitors receive points for their item based on their knowledge and enthusiasm, (Barriault, 2001). Using their points, visitors trade their specimens for other nature specimens in the Nature Exchange (Barriault, 2001). The intended outcomes of the Nature Exchange, as described by King (2009), are as follows:

- to foster an appreciation and understanding of the natural environment;
- to provide a space that encourages visitors to observe, think, reflect, and learn;
- to create an experience for visitors that transforms curiosity into learning;
- to teach visitors about environmentally ethical collecting.

According to King (2009), the Nature Exchange at the Woodland Park Zoo in Seattle, Washington successfully encouraged visitors to spend more time outdoors and to develop a greater interest in nature. In addition, the Nature Exchange program provided an opportunity for
visitors, especially children, to practice and improve their observation and communication skills (King, 2009).

Institutions can purchase a turnkey Nature Exchange package from Science North for $250,000 US dollars, with an additional annual fee (Science North, 2012). A minimum of 80 m² is required to house the facility (Science North, 2012, Nature Exchange section). An essential part of the Nature Exchange is interactions between visitors and staff and the sharing of information; therefore the facility must be staffed (King, 2009). At this time, this Nature Exchange package is not a practical option for the Museum of Natural History, due to its resource and space requirements. Therefore, using the Nature Lab and the Museum’s other available resources to create a public program with similar outcomes as the Nature Exchange program would be a better alternative.

**Nature Lab.** Intended as an animal care facility and public programing space, the Nature Lab was constructed as part of the recent renovations at the Museum. Officially opened in 2010, the Nature Lab provides an area where visitors can interact with the live collections and share their encounters with nature with the interpretation staff. Using the resources in the Nature Lab, interpretative staff help visitors identify specimens that the visitors bring in as part of the *Enquiry Program*. Often, Enquiry Program live specimens, donated to the Museum, are displayed in this space.

Since the Nature Lab has become a place for specimens and informal interpretative conversations, it could be a suitable location for a public program similar to the Nature Exchange. The establishment of a long-term public program would help define the function of the Nature Lab for visitors; visitors would have a better understanding of the Nature Lab and how it could add value to their visit. As with all the other interpretative programs and exhibition
spaces, the Nature Lab and this new public program need to be evaluated to ensure the intended interpretative impact is being achieved. The Nova Scotia Museum supports ongoing evaluation of both existing and planned interpretive programs (Nova Scotia Museum, 2009).

Other nature observation programs. The Museum has two public programs that encourage awareness, observation, and understanding of the natural environment that I can use as sources of inspiration for the development of a new public program: the active Enquiry Program, and the inactive Thousand Eyes Project. However, these programs are outdated and urgently need to be restructured or incorporated into a new public program.

Enquiry Program. Similar to the Nature Exchange, the Enquiry Program provides the public with an opportunity to bring nature specimens to the Museum to be identified by interpretative staff or a curator. Visitors also can share their nature observations by email, phone, or in person. From time to time, specimens and observations supplied by the public have made valuable contributions to the Museum’s collections and records.

Although the Enquiry Program has been restructured several times, there is still need for improvement, including more opportunities for visitor engagement and clearer objectives. In particular, the public’s common nature observations are often not consistently or formally recorded; there is no incentive for the public to provide additional observations and cultivate an interest in recording natural history observations.

Thousand Eyes Project. Started in the 1990’s, the Thousand Eyes Project was modelled after an early 20th century phenology project program under the direction of Dr. Alexander MacKay, project founder and provincial school superintendent. Between 1900 and 1932, hundreds of students in Nova Scotia recorded observations from over 200 different seasonal events (Thousand Eyes Project, n.d., Connecting to the Past section). MacKay, who introduced
physical education to the province, believed that students learned better by “doing things rather than just sitting thinking about them” (Thousand Eyes Project, n.d., The Story of Dr. MacKay section).

The modern version of the Thousand Eyes Project invited students to make 50 seasonal natural history observations and record their findings on a website (Thousand Eyes Project, n.d., Connecting to the Past section). Participants could compare their findings to those originally collected a hundred years ago by students (Thousand Eyes Project, n.d.). Unfortunately, the program is dormant and this website is currently inactive.

**New public program design.** Following the recommendations outlined in the Interpretative Master Plan, as well as, to assist in the fulfilment of the Museum of Natural History’s mandate, I developed a public program, *Exploring Your Extraordinary Surroundings (EYES)*, for the Nature Lab. With similar outcomes as the Nature Exchange program, the new EYES program will provide visitors with an opportunity to foster an appreciation of nature through observation and reflection (King, 2009). Designed to raise visitors’ awareness of and interest in nature, the EYES program encourages visitors to explore local natural areas and to make their own nature observations. Reminiscent of the former Thousand Eyes Project, visitors are introduced to different seasonal phenomena and, like the Enquiry Program, are encouraged to share their observations with the Museum. In the future, the public’s common nature observations, which were previously processed by the Enquiry Program, would potentially be better managed under this new public program, especially those observations with no immediate value to the collection records. The new public program (see Appendix A for the full program outline):
• engages visitors by providing information about natural history and hands-on experiences;
• encourages visitors to make their own nature observations;
• provides opportunities for visitors to share their findings and experiences during a return visit to the Museum of Natural History and/or through social media.

Learning for fun can be a “potentially transformative experience” (Falk, Heimlich, & Foutz, 2009, p. 57). In a museum—a free-choice learning environment—transformational experiences can happen by providing opportunities for visitors to explore new ideas and concepts that can guide their own learning, allowing the creation of their own personal knowledge (Soren, 2009). During the EYES program, the visitor can choose to participate in several different activities. To create a meaningful and fun experience for visitors, this new program involves: real things (Black, 2005), discovery, use of multiple senses, simple activities, social engagement, and the opportunity for visitors to choose their own experiences (Falk et al., 2009). The activities in the EYES program are hands-on in order to appeal to youth and to potentially result in greater program engagement (Fitzsimmons, 2012). These interactive activities are intended to result in the following program outcomes:

• to foster an appreciation and understanding of natural history;
• to encourage visitors to observe, think, and reflect;
• to stimulate visitors’ curiosity about their natural surroundings.

Research Questions

For this study, I conducted a preliminary formative evaluation of EYES, to assess the visitors’ interests in this new public program and its effectiveness in fulfilling its intended outcomes. This evaluation investigated the following research questions:
Will visitors be interested in participating in this type of nature observation program?

How can this new public program fulfill its intended outcomes?

How well does the Nature Lab work as a programming space for this new public program or any other programs?

Recommendations for the future development of the EYES program (see Chapter 5) are based on the results of this evaluation. These recommendations include suggestions on ways in which the Museum should invest its resources to make this new public program a success, and on potential improvements to the Nature Lab.

Study Delimitation and Limitations

Delimitations. Although the trial public program, EYES in Winter, was open to all museum visitors, it targeted the Museum’s main audience—families with young children. Naturally, the significance of the evaluation results would be higher with a greater number of program participants (Krejcie & Morgan, 1970). This program is intended for the Nature Lab; therefore, the trial occurred in the Nature Lab even though the participation rate may have been better if I had set the program in a known high traffic location. The trial public program was also offered for the same length of time, for two hours, and the same days, as other Nature Lab programs. To mimic an element from the Thousand Eyes Project, visitors were encouraged to make seasonal nature observations. Since the trial program took place over the months of January and February, visitors were asked to make winter nature observations. Winter, with its simplicity, can be the ideal season for visitors to be introduced to the different aspects of the natural world (Stokes, 1976), but the inclement conditions can be prohibitive to participation in outdoor activities.
Similar to the trial public program, the online survey was mainly intended for those invested in the Museum (e.g. frequent visitors) and who would most likely benefit from the new program. Therefore, the online survey was only promoted onsite and on the Museum’s website, Facebook and Twitter pages. In addition, the survey prize, a Gus Prize Pack, was intended to attract participants who had knowledge of and an interest in the Museum. If I had promoted the online survey to a broader, more general audience, I might have received more responses, however, the relevance of the results would have been lower. To increase the response rate, I ensured the survey was easy for participants to complete by limiting it to 20 questions and making the majority of the questions multiple choice.

**Limitations.** Museum visitation is governed by many external factors (Hood, 1991). Over the two month trial period, the visitation rate limited the number of visitors who were available to potentially participate in the public program. Museums are free-choice learning environments (Falk, 2004); even if a person visited the Museum, there was no guarantee that they would decide to visit the Nature Lab or participate in the trial program. Financial and staff resources were limited. The EYES program was developed using existing program materials and online resources. Due to a staff shortage during the trial period, I facilitated the program on my own, and therefore, the number of observations of visitor characteristics and behaviours I could make was limited. In addition, the visitor data could not be captured from visitors who may have participated in the onsite public program, and thus were encouraged to make their own nature observations, but never shared their experiences with the Museum.

**Research Significance**

Bill McKibben, author and climate change activist, stressed the importance of getting children to fall in love with the natural world by providing opportunities for them to be outside
and engaged (Playful Planet, 2012, 0.21). First-hand experiences with nature greatly contribute to the development of environmental values in children, as well as adults (Burgess & Mayer-Smith, 2011). At a time when other facets of modern society are discouraging interaction with nature (Louv, 2005), it is essential for institutions, like natural history museums, to encourage the public to appreciate their local natural environments (Falk et. al, 2007). By integrating natural history practices, observations and awareness, into the lives of their visitors, museums have the power to shift their visitors’ attention to their natural surroundings, promoting a healthier and more environmentally sustainable lifestyle (Kolan & Poleman, 2009). A museum public program, like the EYES program, has the potential to offer visitors valuable opportunities to re-establish visitors’ connections with nature (Falk et al., 2007).

The EYES program could contribute to a campaign instigated by numerous organizations around the world to get people outdoors and connected with nature. In Canada, there are several organizations that focus on nature-based experiences. For example, in May 2013, the David Suzuki Foundation challenged Canadians to commit to spending 30 minutes in nature each day, for 30 days, to improve their health and well-being; over 10,000 participants submitted stories and pictures of their outdoor adventures to win weekly prizes (http://30x30.davidsuzuki.org). In other examples, the Children and Nature Network (www.childrenandnature.org), Child & Nature Alliance of Canada (http://childnature.ca/), and Nature Canada (www.naturecanada.ca) support individuals and organizations working to connect youth, families, and children with nature by offering activity ideas and events. Additionally, NatureWatch, administered by Nature Canada, invites the public to make seasonal nature observations and record them on their website. FrogWatch, one of the NatureWatch programs, was initiated by the Nova Scotia Museum of Natural History in 1996 (www.naturewatch.ca/english/frogwatch/ns/). Finally, every month at
the Museum, the Young Naturalist Club hosts engaging presentations for families, followed by field trips, to encourage exploration and learning about nature. All of the above organizations represent potential partnerships or support for the EYES program.

Recently, there has been a growing movement to revitalize the approach to natural history education programs (Kolan & Poleman, 2009); these renewed programs are designed to be fun learning experiences that inspire curiosity, engage the senses, and allow flexibility for visitors to choose their experiences (Falk et al., 2009). Representing this approach, the new EYES program at the Museum of Natural History would contribute to the Museum’s commitment to innovative and meaningful interpretative programming. In addition, by encouraging visitors to share their experiences, this program can strengthen the museum’s relationship with them. Through its ongoing interactions with the public, the EYES program will also provide us with a unique opportunity to continually monitor the impact of this public program—thus providing valuable information that will aid in the development of future programs.

The research completed for this thesis supports the successful development of the EYES program so that it best meets the needs of both the Museum and the program participants. Therefore, this research is relevant at several levels. It will help to foster positive experiences for the individuals who participate in the program, both at the museum and as they make their own nature observations after their museum visits. The new program also supports the institutional and regional goals of the Nova Scotia Museum, in general, and the Museum of Natural History, in particular, to develop dynamic programs for their visitors. Finally, by supporting the development of the EYES program, the research supports national and global initiatives to revamp environmental education, foster outdoor experiences, and promote human-nature connections in the general public.
Researcher’s Perspective

As a child, I had many positive experiences with my family in the outdoors—camping, canoeing and hiking—which helped to foster my appreciation for nature. These experiences have provided me with a strong environmental ethic. As a result, through my professional and volunteer experiences, I have chosen to support environmental conservation and share my interest in natural history with others. As a member of the interpretation team at the Museum of Natural History, I have an opportunity to engage the public and possibly provide them with a better understanding of the importance of the natural world. While at the Museum, I have seen examples of the visitors’ disconnection from nature, particularly in their questions. Often, children will ask if the live animals in the terrariums are real and even some adults are surprised to learn that all the animals in the display can be found around the Halifax area. Therefore, I see a need for a public program that encourages the public to make observations and be more aware of their local natural environment.

For this study, my major bias is my close proximity to the project. I created the EYES in Winter program and I am professionally responsible for the success of the Nature Lab programs. However, I understand that receiving feedback from visitors and my colleagues can greatly benefit the creation of an effective public program. To benefit from our different backgrounds and experiences, the interpretative staff often works as a team, assisting each other with program development. Therefore, I was eager to have an opportunity to receive visitor feedback about the EYES program and to become more familiar with museum program evaluation techniques. As museum interpreter, I am excited to have the opportunity to create and deliver this potentially transformative experience.
Several research studies have demonstrated a need for a museum program, such as EYES, to help reconnect people with nature. In this chapter, I will explore what Louv has termed “nature deficit disorder” issue (Louv, 2005) and possible solutions. To assist in the development of an effective public program, I examined the learning processes of museum visitors and by what means visitors’ behaviours, attitudes, and values can be changed using the Museum’s resources. In addition, I investigated the history of museum evaluation and different methods to provide a foundation for this preliminary formative evaluation.

**Nature-deficit Disorder**

As wild spaces along with their flora and fauna disappear, opportunities for people to have meaningful nature experiences are vanishing. This possibly could lead to the continued loss of the natural environment due to our disconnection from nature; Robert Pyle, ecologist and author, described this phenomenon as the “extinction of experience” (Miller, 2005, p. 430). Increasing urbanization and dependence on technology have caused a growing gap between humans and nature (Louv, 2011). This present phenomenon, that children and adults have fewer opportunities to engage with the natural world, is well documented (Swaisgood & Sheppard, 2011). Nature-deficit disorder was the term used by Louv (2005), in *Last Child in the Woods*, to describe children’s disconnection from the natural world. Louv’s (2005) diagnosis resonated with many educators, including me, and prompted many adults to share their own sense of loss (Louv, 2011). As a result, Louv published *The Nature Principle* in 2011, which described every human’s need for “vitamin N – for Nature” (p. 47).

Over the past several decades, studies indicate a significant increase in our disconnection from the natural world due to a shift to a more sedentary lifestyle and urban living (Charles &
Globally, more than 50% of all people live in urban areas and this number is projected to increase to 60% by 2030 (World Health Organization, 2013). The average person in North America spends an estimated 90% of their time indoors (Allen, McClean, Stapleton, Nelson, and Webster, 2007). For example, children spend less time outdoors participating in unstructured play and more time indoors using electronic media (McCurdy, Winterbottom, Mehta, & Roberts, 2010). A 2011 study, conducted by Colley, Garriguet, Janssen, Craig, Clarke and Tremblay (2011), found that Canadian children and youth spend 8.6 hours per day engaged in sedentary activities such as watching television and using computers. Charles and Louv (2009) referred to several quantitative and qualitative studies offering mounting evidence relating to nature-deficit disorder, including: less free time for unstructured outdoor play, a dramatic rise in obesity, reduced mobility (i.e. walking or riding a bike to school), a growing fear of strangers, traffic, and nature. As children spend less time in natural surroundings, “their senses narrow, physiologically and psychologically, and this reduces the richness of the human experience” (Louv, 2005, p. 3).

Time spent in the outdoors can benefit our mental, physical, and spiritual health (Louv, 2005). For example, in some of the earliest research in this area, Ulrich (1984) determined that surgery patients, who had windows that viewed a more natural setting, recovered faster and required less pain medication than those patients who had windows that viewed a brick wall. More recent research has equated lower stress: improved social interactions, faster recovery from illness, reduced mental fatigue, increased attention, and higher productivity as possible benefits from spending time in nature (Lohr, 2007). Additionally, for children, outdoor play appears to be important for “developing the capacities for creativity, problem-solving, and emotional and intellectual development” (Charles & Louv, 2009, p. 4). Health care professionals were advised
by McCurdy et al. (2010) to prescribe outdoor activities to counteract conditions such as Type 2 diabetes, asthma, and attention-deficit disorder.

**Impact on environmental ethics.** “If people no longer value nature or see it as relevant to their lives, will they be willing to invest in its protection?” (Miller, 2005, p. 431). The more time people, especially children, spend interacting with electronic devices, the more their ecological literacy potentially decreases, affecting, in particular, their awareness of the impact of complex environmental issues such as climate change and habitat loss (Hall & Bauer-Armstrong, 2011). Direct experiences in nature, not electronic stimulation and virtual experience, can spawn the next generation of environmental stewards (Swaisgood & Sheppard, 2011). “Spending time in nature is essential for the development of an environmental ethic” (Falk et al., 2007, p.12). By developing a better understanding and appreciation for uniqueness of local natural spaces, including: flora, fauna, climate, culture, and physical features, we can potentially learn to live more sustainable lives (Kolan & Poleman, 2009). Likewise, biophilia, the love of life and living beings, is believed to encourage an increased awareness and concern for environmental conservation (Burgess & Mayer-Smith, 2011).

**Reconnecting with Nature**

Louv (2011) defines nature as anywhere from a wilderness area to a city, where human beings can experience a meaningful kinship with another species. Even the simple act of adding a plant to an office can have a positive effect on our cognitive function, mood, and self-esteem (Buzzell & Chalquist, 2009). In addition, direct interactions with animals can help us develop a bond with nature and move ourselves toward the path of caring about the natural world (Kahn & Kellert, 2002). By going to parks, zoos and aquariums, we are subconsciously seeking to rekindle our relationship with nature (Kahn & Hasbach, 2012).
Our connection to nature currently exists inside us and only has to be rediscovered (Kahn & Hasbach, 2012). This human connection to nature is embedded in our genetic structure (Louv, 2011). The human body has evolved to be receptive to sensory stimulation provided by nature; this stimulation helps us connect with nature (Buzzell & Chalquist, 2009). Through their observations and examination of the children’s learning journals, Burgess and Mayer-Smith (2011) found that first-hand nature experiences, in their outdoor education program, encouraged a connection with nature.

Designers, developers, educators, political leaders and citizens throughout society need to provide opportunities for people, especially children, to engage and immerse themselves in nature (Charles & Louv, 2009). “Nearby nature” should be the focus of urban planning and development according to Charles and Louv (2009, p. 1), in order to increase natural experiences and reconnect the public with food sources, for example, through urban gardens. In addition, scientists and educators can act as important mentors of inspiration for people to reconnect with nature through educational programs and their own actions (Swaisgood & Sheppard, 2011).

Learning and Changing Behaviours

Learning process. “Learning is change and change is not instant” (Rennie & Johnston, 2004, p. 6). We learn by making connections to, or between, previously separate ideas, or we can have the potential to make new connections in the future (Rennie & Johnston, 2004). These connections form over time through a series of transactions (Tallmadge, 2011). In addition to facts and concepts, neural changes are prompted by feelings, attitudes, and behaviors; studies strongly suggest that these factors are highly interconnected (Falk, 2005). Learning depends on the individual; the process is different for each person (Falk, 2005). The structure of new learning will be influenced by an individual’s cognitive, affective, behavioral, social, or cultural
experiences (Rennie & Johnston, 2004). This process of change requires time for reflection to enable us to link new information with the old information and consider the resulting change in our perspective. It is difficult to observe if an individual has gained any new knowledge or is presently considering a new opinion or behavior, however, learning can be observed through an individual’s actions (Rennie & Johnston, 2004).

As a museum educator, I can provide learning opportunities and guidance for visitors, but visitors have control over their own learning. People create their own understanding of reality through their own experiences that involves their perceptions, emotions, and behaviours, according to their own unique structure (Capra, 1996). Learning represents a change in an individual’s cognitive structure (Capra, 1996). By providing experiences that can act as triggers, I can potentially affect an individual’s cognitive structure. However, not all experiences can cause structural change (Maturana & Poerksen, 2004a). Each individual has their own knowledge and values based on their own constructed reality (Capra, 1996). If new ideas are introduced that are outside an individual’s reality, he/she will not be receptive to this new information (Capra, 1996). As an educator, it is important to attempt to understand these differences rather than try to force the introduction of new ideas (Maturana & Poerksen, 2004b). A more effective educational approach is to account for and work with an individual’s existing knowledge and values (Maturana & Poerksen, 2004b).

Emotions can impact learning; individuals who are curious, confident, calm, enthusiastic and excited are more open to new ideas and information than those who are anxious, confused and frustrated (Kort, Reilly, & Picard, 2001). Providing conditions for the individual optimum learning state can improve the efficiency and pleasure of the learning process (Kort et al., 2001). Furthermore, our emotions are part of our rational thought processes and guide our decisions.
more than learned facts or concepts (Lakoff, 2010). He suggested that targeting a person’s emotions can be a powerful trigger in an attempt to change an individual’s cognitive structure; telling stories that used themes which invoked empathy, could be a more effective way to connect your audience to an idea than conveying just the facts alone. Allen (2004) discussed the powerful effect of using personal narratives in cultural and history museum exhibits to invoke emotions and enhance the learning experience. Maturana and Poerksen, (2004b) suggested “aesthetic seduction” as a way to communicate your ideas by creating a beautiful mental picture in which your audience could potentially become emotionally involved. In addition, direct experiences, such as encounters with nature, can have an emotional impact (Ballantyne & Packer, 2005). Lakeoff (2010) also commented that the power of direct experience in nature could change an individual’s view of the natural environment.

**Changing behaviours.** “Transcending paradigms requires an experience or set of experiences that requires you to think and see things differently” (Cloud, 2005). Our behaviours are motivated by our values; our values represent what we believe is important in life and are linked to our emotions (World Wildlife Fund UK, 2010). Lakeoff (2010) stated that the values that are at the core of the “progressive moral system are empathy, responsibility and the ethic of excellence” (p. 76). The activation of values can affect behaviours (Maio, Pakizhe, Cheung, & Rees, 2009) and an individual’s values can be activated by introducing people to new ideas. Additionally, values can be reinforced, making future activation easier, by repeated activation through social and cultural influences (World Wildlife Fund UK, 2010).

An individual’s behaviours are greatly influenced by social situations, institutional contexts and cultural norms, in a way similar to how values are influenced (Shove, 2010). In their experiment, Maio et al. (2009) demonstrated that activation of certain social values
promoted an increase in compatible behaviours and decreased or prevented behaviours associated with opposing values. Adoption of new behaviours depends on a “mixture of positive motivators”, such as a good feeling, social norms or belonging, and negative barriers, such as demand on time, habits or disempowerment (Shove, 2010, p. 1275), so that social and cultural supports are key to individual behaviour changes.

**Potential Impact of Museums**

Globally, most environmental education is acquired in informal environments, such as museums, that offer free-choice learning experiences (Falk, 2005). Sturm and Bogner (2010) compared two groups of students, and found that the students who studied in the museum learned more and were more motivated than the students who studied in the classroom. The free-choice and non-evaluative nature of the museum motivated and encouraged students to learn and possibly, even awakened their interest in the natural environment. With the growing separation of human populations from nature, there is an increased demand for institutions, like museums, to provide visitors with experiences that foster understanding, appreciation, and conservation of the natural environment (Ballantyne, Packer, & Sutherland, 2011). However, if museums are going to impact on their visitors’ lives, these institutions must be able to change visitors’ attitudes, values, and behaviors in some way (Rennie & Johnston, 2004). Overall, the impact of museums on their visitors is not a onetime event. In contrast, it is more subtle and cumulative over repeated visits, generally taking place over many years (Weil, 2002). The free-choice nature of museums allow the definition of learning to be expanded and to include the cultivation of attention and thinking skills through mentored experiences (Duke, 2010). Museums provide learner-centered experiences which offer visitors opportunities to explore, examine, make choices, make personal connections and develop their own way of understanding (Ballantyne et
al., 2011). Weil (2002) thought that the greatest strength of museums was their ability to confirm, reinforce, and extend the existing knowledge and beliefs of their visitors. By providing free-choice learning environments, museum education will most likely result in long-term behavioural change that will make a positive difference toward an environmentally sustainable community (Ballantyne et al., 2011).

In recent years, there have been several research studies conducted to demonstrate the effectiveness of museums and other free-choice learning environments to impact their visitors’ way of thinking. Ballantyne and Packer (2005) discussed the findings of a qualitative study by Packer in 2004 that found that many participants were successfully able to question and rethink their attitudes and behaviours in relation to environmental issues as a result of their visits to a variety of free-choice learning settings, including an aquarium and a national park. In 2007, a random telephone survey conducted by Falk, Storksdieck, and Dierking (2007) found that nearly half of the respondents reported their science understanding was primarily acquired from leisure time activities and free-choice learning environments for reasons related to personal interest, need, and/or curiosity. Packer and Ballantyne (2005) completed a major study that surveyed 1000 people about their visits to four different zoos and aquariums where visitors had encounters with wildlife. Four months after their visits, 39% of the respondents still retained some new knowledge or understanding, and a few people had questioned their values or changed their personal attitudes as a result of the experience. In addition, a few respondents from the Packer and Ballantyne study reported some new environmentally-friendly actions as a result of the wildlife experience including: changing household and purchasing practices, researching further information, and volunteering for environmental causes. In two case studies, Soren (2009) examined the abilities of museums to offer experiences that would transform their visitors. Her
research indicated that possible triggers for transformational experiences included: direct interactions with real objects, emotional connections, and the motivation to become more proactive in their lives.

**Museum experiences.** Weil (2002) argued that the best that museums should hope and expect to do was to make positive contributions to the quality of their visitors’ lives. To this end, museums need to provide a variety of learning opportunities and possibilities for visitors of all ages, educational backgrounds, or physical abilities (Lord, 2007). Visitors enter museums with their own agendas and may visit a museum for any of the following reasons: to socialize, learn something new, see something new, revisit their favourite exhibits, and to satisfy a curiosity (Weil, 2002). Falk and Storksdieck (2010) suggested that visitors could be placed in five broad identity-related categories based on motivational terms:

- **Explorers** are driven by curiosity and are interested in a variety of topics with a desire to experience something new;
- **Facilitators** are primarily focused on assisting others in their accompanying social group with their learning experience;
- **Hobbyists** have a specific interest and are very knowledgeable and want to further their knowledge on this topic;
- **Experience Seekers** are motivated to visit because they perceive the museum as a destination and are only focused on the highlights;
- **Rechargers** are primarily searching for a reflective and/or restorative experience and are not concerned with content.

**Free-choice learning environment.** To meet the challenge of satisfying the needs of every individual visitor, museums provide free-choice learning environments (Falk &
As free-choice learning environments, museums provide visitors with the flexibility to pursue their own interests at their own pace and “fulfill their needs for relaxation, enjoyment, intellectual stimulation and even spiritual fulfillment” (Falk, 2005, p. 266). This quality of totally unrestricted choice for museum visitors has “huge implications for learning” (Allen, 2004, p. 18). Falk, along with other researchers, have completed a number of studies on the benefits of this type of learner-centered experiences. According to Falk (2005), free-choice learning experiences play a major role in lifelong learning and environmental education outside formal education programs. Overall, visitors consider the museum learning environment to be fun, and fun experiences can result in a transformative experience (Falk et al., 2009).

**Orientation.** Although providing free-choice learning environments can be beneficial, its execution depends on the visitors’ abilities to successfully orient and navigate through the space (Falk, 2004). Goulding (2000) maintained that “blind” exploration, without direction, can increase the visitors’ anxiety and decrease the enjoyment of the learning experience and that clear “scene setters” are needed to enhance the visitors’ “understanding, orientation and satisfaction” (p. 271). These “advance organizers” that help visitors plan their visit have been shown to positively influence visitor learning (Falk, 2004, p. 85).

Allen (2004) discussed the advantages of “immediate apprehendability” of a museum experience to increase the visitors’ comfort and overall enjoyment of learning (p. 24). Museums need to inform visitors about current exhibits, daily events and how to navigate around the building (Allen, 2004). Hobbyists may require additional information about the collections and a wide range of information resources (Booth, 1998). Museum fatigue can limit visitors’ learning and have a negative impact on their experiences (Allen, 2004). Museums need to take the appropriate steps to ensure visitors do not become overloaded by keeping visitors moving and
engaged and by providing space for rest and reflection (Allen, 2004). In addition, Falk (2004) affirmed that studies have also shown that various architectural and design factors such as lighting, crowding, color, sound, and space can influence visitor learning.

**Informal learning outcomes.** Museums are “dynamic learning environments” that support “real world learning” and do not just transmit knowledge (Falk, 2004, p. 91). In museum settings, visitors’ experiences are mostly driven by their own needs and interests rather than by the directives and needs of the institutions (Ballantyne & Packer, 2005). Since visitor discretion determines which messages will have their attention, the effectiveness of the museum’s predetermined educational outcomes is not guaranteed (Storksdieck, Ellenbogen, & Heimlich, 2005). In other words, visitors may or may not learn what the museum intended them to learn, but every visitor does learn something regardless of their motivation for visiting (Falk, 2005). Therefore, assessing the impact of programs and exhibitions is challenging and museum educators must take careful consideration when identifying the key goals and learning outcomes of their programs and exhibitions (Storksdieck et al., 2005). Although studies have shown that visitor learning is strongly shaped by their identity-related motivations, museums should not necessarily abandon their goals and solely cater to the visitors’ interests (Falk & Storksdieck, 2010). Instead, museums need to better understand how their goals can be successfully accomplished (Falk & Storksdieck, 2010). This realization will involve “a tighter alignment between expectations and reality” which will enhance the visitors’ experiences and affect how museums define their goals and evaluate their impact (Falk & Storksdieck, 2010, p. 210).

Generally, the goals of informal educational settings are much broader than the formal learning goals (Ballantyne & Packer, 2005). Informal learning outcomes, as suggested by Storksdieck et al. (2005), can be defined by three categories: incidental, broader, and re-affirmation. Incidental
learning outcomes are related to the experience but were not specifically intended; for example a visitor’s increased self-confidence after completing an activity. General outcomes such as observation skills, gaining an appreciation for nature or losing fears, are broader outcomes. Reinforcing previously held knowledge, attitudes, beliefs, such as confirming a visitor’s previous knowledge of ecosystems, would be considered a re-affirmation outcome. Furthermore, Ballantyne and Packer (2005) proposed such informal learning outcomes as: “encouraging curiosity and exploration, changing attitudes, evoking feelings, developing a sense of personal, cultural and community identity, and making decisions about moral and ethical issues” (p. 282).

Museums Creating a Nature Connection

**Museum resources.** Museums are “physical settings unlike those most people encounter in their daily lives” (Falk, 2004, p. 84). In effective museums, all aspects of the building’s architecture, and the design of each space should significantly enhance the learning process (Lord, 2007). Interactive galleries, stimulating exhibitions, realistic dioramas, and learning facilities such as labs and discovery centers can provide visitors with a wealth of opportunities to connect with nature (Lord, 2007). Flannery (1998) commented that Henry Fairfield Osborn, who headed the American Museum of Natural History in the early 20th century, thought dioramas helped people living in urban areas understand the richness of biodiversity. Designed to transport the visitor to a “natural” environment, dioramas are complex art installations based on scientific knowledge of plants, animals and habitats (Flannery, 1998). Using paintings, models and specimens, these representations were intended to provide visitors with an appreciation of nature with the hope that visitors would be more willing to support conservation (Flannery, 1998).
Ballantyne, Packer, and Sutherland (2011) stated that research has demonstrated that hands-on experiences with nature can promote positive emotions towards the natural world. Natural history museum collections provide information about biodiversity and habitats of the local area through observational records and physical specimens (Kress, Miller, Krupnick & Lovejoy, 2001). Through public programs, interpreters use this collection of real things to help visitors become familiar with local animals and plants and encourage an interest in local species (Kress et al., 2001). Additionally, lab and discovery centers, such as the Nature Exchange, offer visitors an opportunity to explore, to observe natural specimens first-hand, and to have interactive discussions with interpretation staff (King, 2009).

**Natural history’s role.** For people living in urban areas, institutions, like natural history museums may provide the best opportunity to acquire an understanding and appreciation of the natural world (Falk et al., 2007). Observation and awareness is fundamental to natural history (Kolan & Poleman, 2009). Observing animals in their habitats and studying their behaviours is a common natural history practice (Tallmadge, 2011). Participating in these natural history practices, visitors are provided with an accessible starting point to learn about biology and conservation (Fitzsimmons, 2012), which may encourage them to seek out additional encounters with nature (Falk et al., 2007). Kahn and Hasbach (2011) stated that through the experience of natural history, we have an opportunity to bring nature forward “so that we can engage what’s left, and where possible, recover what’s lost” (p. 7). Reintegrating natural history into visitors’ lives may heighten the visitors’ awareness of their local natural environment, potentially establishing a sense of connection and belonging that will increase their need to protect it (Kolan & Poleman, 2009). Not only may the sharing of interest in natural history connect visitors with...
nature, but it may help continue the practice to benefit future generations (Kolan & Poleman, 2009).

**Creating the Experience**

Museums can empower visitors to notice, wonder and make connections with ideas and previous learning; to visitors, museums can be an “intellectual and aesthetic gymnasium” (Duke, 2010, p. 275). Today, museums have shifted their focus from transmitting knowledge toward creating meaningful experiences for their visitors (Ballantyne & Packer, 2005). The core purpose of interpretation should be to produce “mindful visitors who are active, interested and capable of questioning and reassessing the situation” (Goulding, 2000, p. 263). If museums only provide information and tell their visitors what to think and how to interpret it, they are missing an important opportunity to engage visitors on a deeper level (Duke, 2010). The best way museums can promote change is by facilitating experiences where visitors actively engage with the material and are challenged to discover connections with ideas on their own (Soren, 2009). In these free-choice environments, visitors choose where they are going to invest their time and attention; they can only engage deeply with the material for a limited period of time before they lose their focused attention and move on (Allen, 2004). Due to the limitation of time to convey messages and make an impact on museum visitors, interpretative programs have to make effective use of museum resources (Allen, 2004). To engage the visitor and promote learning and exploration, the experience needs to generate emotion, stimulate cognition, and have opportunities for social interactions (Falk et al., 2009).

Interactive hands-on activities can aid the process of “transformative experiences” in which visitors develop new attitudes, interests, appreciations, or values (Soren, 2009, p.235). First, these activities should engage multiple senses that will heighten the visitor’s awareness and
connection with the material (Kolan & Poleman, 2009). Second, interacting with real specimens and live animals, through these hand-on activities, can evoke an emotional response that can potentially alter the visitors’ perspectives on nature (Kahn & Kellert, 2002). Third, to stimulate cognition, program activities should provide information that will guide visitors through their own investigations (Soren, 2009). Fourth, social learning within the family structure and amongst friends is an important learning resource (Falk, Storksdieck & Dierking, 2007). Despite the learning opportunities provided by museums, visitors usually visit, foremost, for social reasons (Weil, 2002). Therefore, to satisfy the social needs of visitors and facilitate family learning, interpretative program exhibits should support the inclusion of more than one member of the social group (Allen, 2004). Visitors should be allowed time to share and reflect, and discuss the connection of this new information to past experiences (Rennie & Johnston, 2004).

Overall, the activities need to be fun to motivate participation and learning; visitors who have no intention of learning can be attracted to learning experiences that are “both enjoyable and productive” (Packer & Ballantyne, 2010, p. 27). In conclusion, activities do not need to be complicated; Allen (2004) provided an example of the success of an “empty” frog tank. Allen (2004) observed that as the visitors were actively engaged in searching for the tank’s live inhabitants, it encouraged social interaction and the sharing of previous knowledge and personal connections.

Evaluating a Museum Program

History of museum evaluations. Over the years, museums have evolved from repositories of knowledge and objects to multidimensional spaces that “invite visitors inside to wonder, encounter and learn” (Kelly, 2004, p. 46). Similarly, museum evaluations have adapted from simply observing visitors in exhibits and recording demographics to attempting to
understand a visitor’s motivations for visiting the museum (Hood, 1991). Kelly (2004) provided a brief overview of visitor studies and cited one of the first visitor studies conducted at the Liverpool Museum, United Kingdom, in the 1880s. This early study formed the foundations of modern museum exhibit evaluation theories and methods.

In the early twentieth-century, Benjamin Gilman formed the foundations of visitor studies; he examined physical problems experienced by visitors in museum settings designed to meet “an aesthetic and curatorial prerogative rather than a visitor-focused one”, which resulted in the creation of the term “museum fatigue” (Kelly, 2004, p. 51). Bitgood (1988) suggested that Arthur Melton’s classic studies in the 1930s are essential resources for all museum professionals dealing with visitors; Melton measured the effectiveness of exhibits in promoting visitor learning (Kelly, 2004).

During the late twentieth century, research efforts were focused on developing appropriate methodologies that were well-designed, reliable and valid (Kelly, 2004). Screven (1990) based much of his work around evaluating the effectiveness of exhibitions and advocated for the importance of evaluation at all stages of program development. At the end of the twentieth century, researchers also made an effort to understand the motivations and perceptions of visitors (Falk 2005). Hood (1991) examined why people did or did not visit museums, based on their leisure time, energy, and money. She determined that six concepts affected the public’s leisure choices: social interaction, participating in activities that benefit themselves or others, feeling comfortable, new challenging experiences, learning opportunities and active participation.

Scriven (2012) defined evaluation as a process that determines “the merit, worth or value of something” (p. 2). Evaluation is different from research; it is based in the daily realities of
organizations and society (Russ-Eft & Prekill, 2009). As Russ-Eft and Prekill (2009) described, evaluations are designed to collect data that provide information that contributes to knowledge; evaluation is one of the three basic forms of disciplined inquiry which also includes research and policy analysis (Guba & Lincoln, 2001).

Although, historically seen as a place of “education for the uneducated masses”, museums have always had the opportunity to shape the identities of their visitors through objects, knowledge, and information; visitors would be encouraged to look for “new connections, meaning-making and learning” (Kelly, 2004, p. 46). Evaluations can provide museums with a better understanding of the effects their programs and exhibits have on their visitors and society (Russ-Eft & Prekill, 2009). In recent years, museums have become interested in understanding their visitors' experiences (Korn, 1994). There is no single approach to museum visitor evaluations; they can take many forms, depending on the many circumstances under which visitors are studied, such as an exhibit setting or an educational program (Korn, 1994). Museum interpretative programs may result in a range of outcomes, both intended and unintended (Weil, 2002). For the intended outcomes, museum operations need to have a “clear formulated purpose, described in terms of a particular and positive outcome that it hopes and expects to achieve” (p. 62). According to Weil, museums need to ensure they have “positive accountability” which involves the effective use of its resources when executing intended outcomes through continual performance monitoring.

Museum evaluations do not only monitor to ensure the quality of programs, they can aid in the short or long term decision making process for program development (Russ-Eft & Prekill, 2009). Through the systematic collection of information about the activities’ characteristics, program evaluations help museum staff make judgments and improvements to plan, design,
develop, and implement interpretative programs (Russ-Eft & Prekill, 2009). In evaluations, audience research that provides information about museum visitors and non-visitors is fundamental to effectively plan and develop exhibitions and programs; comprehensive information about the audience and its behaviour is critical when any changes are being considered (Kelly, 2004).

**Types of museum exhibit evaluations.** The different classifications for museum evaluation are: front-end, formative, summative, and remedial (Bitgood, 1994). Bitgood (1994) discusses the varying views of researchers on how these evaluations should be classified. Miles, for example, argued that evaluation should be classified based on the time when evaluation occurs and what is being evaluated, while Screven added that the classification should include the purpose of evaluation (Bitgood, 1994). Furthermore, Bitgood suggested that museum evaluation “should meet at least three criteria: (1) it should order our knowledge, (2) it should promote clear thought, and (3) it should be parsimonious” (1994, p. 8). They are never finished and should be applied during the entire life of an exhibit or a program.

Formative evaluation examines a proposed or developing product, while summative evaluation is conducted after the development is completed (Guba & Lincoln, 2001). Formerly, only summative evaluations were conducted (Korn, 1994), which occurred after an exhibit had opened or a program had been delivered; they collected data on how the product worked overall and could potentially lead to changes or assist with the development of future exhibits or programs (Screven, 1990). However, findings at this final stage were often ignored due to financial or logistical constraints; therefore, formative evaluations were adopted (Korn, 1994). Formative evaluations obtain information about visitors’ reactions to temporary versions of the key elements of programs or exhibits, including visitor attraction and holding power, and how
effectively intended messages were communicated (Bitgood, 1994). This stage uses mock-ups of proposed exhibits or programs and visitors are often observed or interviewed (Kelly, 2004). This evaluation stage helps to identify potentially popular programs and helps to suggest improvements before the final product is completed, thus conserving valuable resources (Screven, 1990).

Using techniques similar to formative evaluations, remedial evaluations are conducted immediately after an exhibit or program opens to handle any initial problems and to make practical suggestions for immediate improvements (Screven, 1990). By examining the practical aspects of the program, remedial evaluations focus on physical and architectural features such as lighting and visitor orientation (Kelly, 2004).

The great benefits gained from formative evaluation in museums led to the idea of conducting evaluations earlier in the design process (Korn, 1994). Representing the first evaluation stage, front-end evaluations provide an opportunity to receive visitor input on a program or exhibit before the design stage begins (Screven, 1990). Front-end evaluations gather information on the visitor’s knowledge, experience, misconceptions, interests and attitudes; this information can be used to refine or improve a program’s or exhibit’s goals, message and design elements (Bitgood, 1994). In addition, front-end evaluations help to capture the complexities of the visitors’ life experiences and knowledge that interact with the experiences offered by the museum (Korn, 1994, p.2).

**Evaluation instruments.** A range of methods are used to obtain information about the museum visitors’ experiences (Kelly, 2004). A few of the most popular techniques listed by Screven (1990) include structured and open-end interviews, informal conversations, tracing visitor movements through exhibits, questionnaires, and unobtrusive observations of visitors’
actions and reactions to mocked-up components of exhibits. Kelly (2004) cited other methods that include video and audio taping visitors, online surveys, focus groups, community workshops, and telephone surveys. Korn (1994) noted that informal visitor interviews can aid designers by providing insight into the reasons behind visitors' behaviours, but cautioned that questions for interviews and surveys should be designed only to provide useful information and should not guide the visitors’ responses toward a particular direction. Other evaluation resources could include “existing market research studies, literature reviews and evaluation reports for similar projects” (Kelly, 2004, p. 57). Additionally, Korn (1994) recommended pre-testing all evaluation instruments to identify any flaws prior to implementation.

**Museum evaluations in the future.** Recently, more museum evaluations have involved the collection of qualitative data rather than being based on quantitative data (Kelly, 2004). This trend increasingly focuses on in-depth conversations with visitors to investigate social groupings and meaning-making experiences in their everyday lives providing a multilayered, complete story of their real lives. Visitors arrive at a museum with their own prior knowledge and individual interests; visitors’ past experiences also help to establish current motivations to attend new programs (Jensen, Dawson, & Falk, 2011). Due to these external factors, understanding the effectiveness of program outcomes is often difficult (Storksdieck et al., 2005). Therefore, museum evaluations need to use a broader approach, like mixed methods, to capture the complexities of the visitors’ perspectives and experiences beyond the scope of their museum visits (Jensen et al., 2011).

Advances in technology have initiated an increased use of online data gathering and analysis, as well as, the use of unobtrusive audio or video-recording of visitors’ behaviours and conversations in studies, thus expanding the possibilities for visitor studies and the ability to
broaden sample populations. Kelly (2004) suggested that museums need to “move beyond an evaluative culture to a research one that focuses on visitor experiences and learning that, in turn, contributes to organisational learning and change” (p. 64). By understanding their impact on visitors, she notes that museums have an opportunity to take a leadership role in the facilitation of learning about a broad range of issues.

Summary

“Museums exist to enhance the quality of the people’s lives” (Black, 2005, p. 286) and have the ability to provide meaningful experiences to reconnect visitors with nature. Through fun activities that include specimens, social interaction, knowledge, and reflection, the EYES program has the potential to encourage visitors to make nature observations and gain a better awareness of their natural surroundings. Although research shows that behavior change occurs over time, as a long term program that cultivates relationship with visitors and repeat visitation, the EYES has an opportunity to make a valuable impact. This study, including both quantitative and qualitative evaluation methods, will not only determine the effectiveness of EYES, but it will add to the understanding of how to create a successful program.
Chapter Three: Research Methodology

Research Design

For this case study, I conducted a formative evaluation designed to provide information to aid in the development of a new public program, Exploring Your Extraordinary Surroundings (EYES), at the Museum of Natural History. A prototype of this new public program, EYES in Winter, designed to encourage visitors to explore their local natural environment, was offered to visitors. To provide a broader perspective, I employed a mixed methods approach that included: an online survey, program statistics collection, and observations of program participants. In addition to providing direction for this new public program, by identifying potential assets and obstacles, this study also provides a better understanding of how to effectively facilitate future public programs in the Museum’s Nature Lab.

Formative evaluation. Evaluation is essential to the development of a meaningful learning experience and can measure the program’s impact and provide a better understanding of the outcomes (Schneider & Cheslock, 2003). For the development of this new public program, a formal front-end evaluation was not conducted. Instead the program design decisions and goals were based on visitors’ positive responses to the existing Enquiry Program and the past success of the Thousand Eyes Project. However, the development of this new program is still in a preliminary stage, therefore, this formative evaluation contained elements of a front-end evaluation. In this study, a trial public program was used to assess attraction, interaction, comprehension, and reaction of the visitors (Screven, 1990). Additionally, an online survey provided insight into the visitors’ motivations and interests in exploring this type of public program.
Mixed methods. A mixed methods approach draws on the strengths of both quantitative and qualitative research and minimizes any weaknesses (Johnson & Onwuegbuzie, 2004); both quantitative and qualitative methods are frequently used in museum evaluations (Schneider & Cheslock, 2003). Using multiple methods can provide a more in-depth understanding of a program and its outcomes; additionally, the results can be triangulated (Johnson & Onwuegbuzie, 2004). For a single researcher, using multiple data collection methods can make the mixed methods approach time consuming and difficult (Johnson & Onwuegbuzie, 2004).

For the short time frame of this study, I applied a mixed methods design in which the dominant quantitative methods were supported by the qualitative methods. Information given by the study participants through an online survey, and program statistics provided by the Museum comprised the quantitative data. During the trial public program, qualitative data was collected through direct observations and open-questions in the online survey. An embedded design was applied; the quantitative data and the qualitative data were collected simultaneously (Leedy & Ormrod, 2013).

Trial public program design. The EYES in Winter public program introduced visitors to a variety of natural phenomena. The program then encouraged visitors to explore local natural areas during the winter to make their own nature observations (see Appendix A for full program outline). Several different activity stations were set up in the Nature Lab that enabled visitors to examine animal and plant specimens, participate in hands-on activities, and have interactive discussions with interpretative staff. Three different types of activities were featured: explore, observe, and investigate/experience. For the explore activities, visitors will explore and learn about a nature-related topic; these activities focus on sharing natural history information. Naturally, during an observe activity, visitors examined various natural phenomena, such as
birds’ nests, and were encouraged to closely examine them; these activities focus on developing observation skills. *Investigate/experience* activities provided visitors with opportunities to investigate or experience nature through their senses in hands-on activities and were encourage to use their senses to make their own discoveries at home.

The pilot public program consisted of three different topics related to winter that rotated each week: birds, trees, and animal signs. *Birds in Winter* explored how birds adapted to winter conditions, encouraged visitors to look for birds’ nests, and to construct a simple birdfeeder to observe birds in their backyard. In *Trees in Winter*, visitors discovered their conifer scent preferences, examined different conifer cones, tried to identify different deciduous trees in winter and counted tree rings. Lastly, visitors investigated *Animal Signs* by trying to identify three mystery animals by looking at tracks, browse, and scat.

During the EYES in Winter program, visitors were encouraged to make their own nature observations through *EYES Adventures* suggestions on the instructional program signage and post-visit activity sheets. Two types of post-visit activity sheets were created; one activity sheet invited visitors to share their encounters with nature on a return visit, by regular mail, email, or via social media (i.e. Facebook, or Twitter) (see Appendix B). In addition to the invitation to share observations, a second activity sheet included suggested local natural areas to explore, winter safety tips, birdfeeder instructions, and a *Winter Nature Bingo* activity (see Appendix C).

**Online survey.** Exit surveys or interviews are commonly used to assess the visitors’ responses to a public program (Korn, 1994). However, the sample population is limited to the visitors who participate in the program and who volunteer to participate in the survey or interview (Korn, 1994). For this study, I chose not to conduct an exit survey and instead decided to conduct an online survey that was open to the public. By broadening the scope of potential
respondents, I was able to receive feedback from people who may not have visited the Museum during the trial program period, but still have an interest in the Museum’s activities. Consequently, by not limiting the survey to program participants, I could better determine potential barriers to participating in the program.

The online survey consisted of 20 questions designed to provide suitable responses for statistical analysis. The majority of these questions were multiple choice and Likert scales, allowing for one or more answers. A few questions were open-ended, enabling participants to supply their own answers (see Appendix D for the full survey instrument). The questions gathered information on the participants’ demographics, visitation frequency and motives, familiarity with the Museum and Nature Lab programs, interest in outdoor activities and natural history interests, and their social media usage. Spaces were also left on the survey to allow participants to provide additional comments. The online survey was created using ClassApps-SelectSurvey.NET, an online survey software program which was approved by the Nova Scotia Government.

Similar to the trial program observations, the online survey was designed to assess the visitors’ needs and interests in a public program that encourages connection with nature. The survey was also meant to help understand how to effectively fulfill program outcomes. Starting with simple questions about the participants’ visitation habits and familiarity with the Museum, the survey led into the main inquiries about their interest in natural history and their need for establishing a connection with nature (Savage & James, 2001). As suggested by Savage and James (2001), questions about the participants’ demographics and an open-ended question to provide the participant with an opportunity for additional comments completed the survey.
Data Collection

**Trial public program observations.** Starting January 12, 2013 and ending March 4, 2013, the trial public program was facilitated for two hours in the Nature Lab on Saturday and Sunday afternoons from 1:00 p.m. to 3:00 p.m., and Wednesday evenings from 6:00 p.m. to 8:00 p.m.. The EYES in Winter program was open to anyone visiting the Museum during the program time. As with other free-choice learning activities, visitors determined which activities they participated in and the amount of time they spent in the Nature Lab. The program was promoted onsite, and online through the Museum’s website, Facebook and Twitter pages.

To assess the attraction power (Screven, 1990) of different activities in the program, observations of the participants were recorded during the facilitation of the public program trial in the Nature Lab. Due to staff shortages, for the majority of the program time, I facilitated the trial public program unaided and was the only one who recorded the observations. Using a standardized form (see Appendix E), the following observations were recorded:

- number of visitors that entered the Nature Lab;
- number of visitors that participated in the program;
- perceived age range of visitors (i.e. young child, child, teenager, young adult, adult, and senior);
- the stations that interested the visitors the most;

In addition, I recorded notes on the overall flow of visitor traffic in the Nature Lab and also attempted to engage the participants in informal conversations about the program and their experiences in nature. Notes from these conversations were included on the observation form.

**Online survey.** Data was collected through the survey instrument which was posted on the Museum’s website between January 12, 2013 and March 6, 2013. To encourage
participation, those who completed the survey were eligible to enter a prize draw for a special private program, annual Museum pass, and Museum merchandise. At the Museum, the survey was promoted through posters, an information handout (see Appendix F), a post-visit activity sheet, and visitor solicitation; online, the survey was promoted on the Museum’s website, Facebook and Twitter pages.

**Museum visitation and public program statistics.** Throughout the two month study period, the following statistics of the public program’s onsite and online elements were recorded:

- number of people who shared their nature observations;
- methods that people used to share their nature observations (i.e. in person, mail, email, Facebook, or Twitter);
- number of different activity sheets that were taken by visitors.

In addition, the Museum of Natural History provided the daily visitation statistics for the test period.

**Reliability and validity.** Measures were taken to ensure the reliability and validity of this formative evaluation. First, all forms and methods of observation were standardized and the online survey remained the same for the duration of the test period. Second, this formative evaluation included: public program observations, an online survey, and program statistics. Using multiple data sources can help support the hypothesis in places where the data convergence is deficient (Leedy & Ormrod, 2013); triangulation of the data can strengthen the study and increase the validity (Golafshani, 2003). Third, to help ensure trust in the participants and to establish trust, prior to their participation, participants were informed about the study’s purpose and their right to refuse to participate at any time (Shenton, 2004). Fourth, as an interpreter at the Museum, I am familiar with the site and its daily operations; therefore, I spent a
prolonged period at the site and had an opportunity to informally observe visitors outside the testing periods in order to gain a broader perspective of the results (Creswell & Miller, 2000). Fifth, during the qualitative analysis, I used the “lens of the researcher” and returned to the data repeatedly to ensure that all possible categories and themes were represented (Creswell & Miller, 2000, p. 125). Finally, I presented my study to my colleagues and pre-tested the survey with them (Shenton, 2004). Their feedback was used to help to ensure the rigour of the online survey and its ease of use for participants before its online release.

Participants and Site

**Participants.** Promotion for the trial public program and online survey focused on the Museum of Natural History visitors, visitors to the Museum’s website, and followers of the Museum’s Facebook and Twitter pages. These participants represent the target audience (young families) for the new public program for the Nature Lab and so their input is valuable for its development. Because these people would most likely benefit from the Museum’s services, they would be naturally interested in the Museum of Natural History and invested in its growth. Both the online survey and the pilot public program were open to anyone; therefore, a convenience sampling process was used (Leedy & Ormrod, 2013); the level of participation was controlled by the participant.

**Site.** At the Museum of Natural History, visitors can explore Nova Scotia’s natural and cultural history through various exhibits. To enhance the visitors’ experiences, the Museum offers regular public programs including presentations, discovery carts, and conversational interpretation. Since the Nature Lab’s opening, there have been public programs in this space featuring live specimens and hands-on activities.
Nature Lab. Space is limited in the Museum, so the Nature Lab space has to service multiple functions. It was designed as an animal care facility, a programming space and a staff work area. At five meters by four meters, the Nature Lab is relatively small. A large stainless steel center counter with stools dominates the room accompanied by a sink inset in a stainless steel counter, as seen in Figure 1. Two cabinets and several cupboards under the center counter provide adequate storage for animal care and program materials. A desk and one computer in the corner are intended as a work area for staff. Additionally, the Nature Lab is equipped with several dissecting microscopes and a microscopic video camera to aid in programming.

Figure 1. The inside of the Nature Lab, at the Museum of Natural History, from the doorway. The activity stations are set up on the center counter for the Summer 2012 public program, Aliens in Our Waters. Picture taken by Heather McKinnon Ramshaw, June 2012
During public programs or when staff is available for conversational interpretation, the space is open for visitors. At these times, visitors have an opportunity to view the animals (i.e. goldfish and crickets) used to feed the other animals on display, as well as live specimens brought to the Museum by visitors as part of the Enquiry Program. These animals are housed in the various aquariums and terrariums on display in the Nature Lab. Above the Nature Lab’s large window, a video monitor displays information about Nature Lab activities and is intended to attract visitors, as seen in Figure 2.

Figure 2. The outside of the Nature Lab, at the Museum of Natural History, from the perspective of the Netukulimk gallery. Picture taken by Heather McKinnon Ramshaw, June 2012.
**Traveling exhibit.** The Museum regularly hosts traveling exhibits. During the public program test period, the traveling exhibit was *Living Under Fire - Life in the Desert* presented by Little Ray’s Reptile Zoo from Ottawa, Ontario. The interactive exhibit featured 11 live animal exhibits, including: African rock pythons, spur thigh tortoises, and bearded dragons, set into panels with descriptions of different desert landscapes. This exhibit was included in the Museum admission and visitors could attend the 30 minute live shows presented by the Little Ray's Reptile Zoo staff at different times throughout the day. On Saturdays and Sundays, the afternoon shows, at 1:30 p.m. and 2:30 p.m., ran at the same time as the EYES in Winter program (Nova Scotia Museum of Natural History, 2013, What to See and Do, Exhibits section). It is possible that the timing between the reptile show and the EYES in Winter program had an impact on the visitation rates for the new pilot program.

**Data Analysis**

**Quantitative data.** The public program statistics and online survey data were analyzed and reported separately. The public program and online survey data were transcribed into a Microsoft Excel spreadsheet and organized in chronological order according to collection time. A statistical software program, SPSS (*Statistical Package for the Social Sciences*), was then used to examine the quantitative data.

**Public program data.** The public program statistics included observations recorded during the trial program and the visitation data provided by the Museum of Natural History’s admissions records. The totals and percentage ratios were calculated for each category: total visitation, entry into the Nature Lab, program participation, age, the topics, and activity participation. The categories were initially compared by examining their percentage ratios and graphing to determine any potential relationships. The significance of these relationships was
examined through statistical analysis. Analysis of variance (ANOVA) were performed to assess the differences between the means (Trochim, 2006) with the alpha set at 0.05. However, since the standard deviations were often greater than the means, as a result of the low case numbers, and since the data was not normally distributed, percentage distributions were used to describe the results (Leedy & Ormrod, 2013).

**Online survey data.** The online survey data was downloaded from the Classapps site into a spreadsheet and separated into tables representing each section of the survey. The personal information collected for the survey prize was not included in this process. Additionally, a summary of the responses with the percentage ratios generated by the survey program was downloaded and the results were transcribed into a spreadsheet. Survey question 11 was open-ended and allowed participants to provide information about their preferred outdoor activities. Similarly, question 14 allowed respondents to fill-in natural history topics of interest beyond those listed in that question. Responses from these questions were tallied and summarized according to the topic; the totals and percentages were calculated.

Likert scale questions can be used to assess attitudes and behaviours (Leedy & Ormrod, 2013). I used this type of question to assess participants’ reasons for visiting the Museum, their views on humans’ connections with nature, and their preferred methods of communications with the Museum. Caution should be taken, however, as analysis of this type of question can be problematic since the data from these questions do not possess a normal probability distribution (University of Northern Iowa, 2013). Since the data for these questions seemed to be grouped toward one end of the scale, I decided to use an *ad hoc* method of analysis outlined by Gardner and Martin (2007) to help me understand the general characteristics of the data. These researchers suggested combining the data into two extreme bins; therefore, I combined the
strongly agree and agree data into an “agree” bin, and the neutral, disagree, and strongly disagree data into a “disagree” bin. Then, I performed Chi square tests with an alpha set 0.05 comparing the two groups for each question.

**Qualitative data.** In this study qualitative data comes from two sources: i) the program observational notes, including the visitors’ reactions and ii) the participant responses given to the open-ended questions on the survey which includes: the additional comments, question 11 (which asked about outdoor activities they participated in most frequently), and question 14 in which they were asked to identify the natural history topics they would be interested in learning. Participant feedback from the additional comments section of the online survey, and the information contained in program observational notes, including any informal conversations, were transcribed on separate Microsoft Excel spreadsheets and organized chronologically by the date recorded. To analyze the qualitative data, I employed the content analysis method described by Tesch (1990). I identified themes based on the data presented and my research questions, and created non-overlapping categories (Tesch 1990). I dissected each comment or observation, and then sorted the results into the relevant categories. Afterwards, I calculated the frequency of occurrence in each category and summarized my conclusions. In addition, for the online survey comments, I identified keywords in the text and recorded their frequency and explored their meanings to add to the understanding of the data (Ryan & Bernard, 2003).

After several conclusions were drawn from the quantitative and qualitative data, I compared the results from the public program observations and online survey to determine how to develop an effective nature observation program for the Nature Lab. The outcome of this comparison is explained in detail in chapters four and five.
Study Conduct

This formative evaluation involved the collection of information from the Museum of Natural History visitors, which included children. Before my research commenced and I began data collection, I applied for an Ethical Review and received approval from the Royal Roads University Research Ethics Board. My research site, the Museum of Natural History, is part of the Department of Community, Culture, and Heritage of Nova Scotia and I am a Nova Scotia Government employee. Therefore, in addition to the Ethical Review from Royal Roads University, my online survey required approval by the Access and Privacy Office and the Department of Community, Culture, and Heritage. According to the Communication Nova Scotia Privacy Policy (2009), any information I collected for my study was managed in accordance with the Freedom of Information and Protection of Privacy Act (FOIPOP), the Personal Information International Disclosure Protection Act (PIIDPA) and the Government Privacy Policy. In addition, to protect anonymity of the participants, no names were included in any transcript or survey data, and the data has been presented in such a way that individuals cannot be identified (i.e. survey data was amalgamated for analyses). For the online survey, the name and contact information that were collected were only used for the draw and then destroyed.

Participants were not pressured to participate in any part of my research project. At the beginning of the online survey, participants were informed about my project’s purpose and their right to refuse to answer any of the questions. For the onsite program observations, a sign was posted outside the Nature Lab, informing visitors that the study was taking place and providing them with the option to participate or to decline by not entering the Nature Lab. A letter of consent (see Appendix G) was made available to onsite participants and no visitors’ comments
were used without their authorization. All promotional materials contained information about the research project and my credentials as a student and as a Museum employee.
Chapter Four: Study Findings

An evaluation was conducted of the new public program, EYES in Winter, for the Museum of Natural History’s Nature Lab. Designed to help visitors foster an appreciation of nature, the aim of this new public program is to engage visitors onsite through interactive activities and encourage them to explore their local natural environments. After participation, visitors were invited to share their discoveries with the Museum. This evaluation examined the following research questions:

• Would visitors be interested in participating in this nature observation program?
• Did the new public program fulfill its intended outcomes?
• How can the Museum invest its resources to help ensure the program’s success?
• How did the Nature Lab work as a programming space for this new public program?

Online Survey Findings

One hundred and ninety-three responses were received; 86% of respondents were female and 89% were in the age ranges of 25 to 34 years, and 35 to 54 years. The majority of the respondents, 83%, lived within Halifax Regional Municipality (HRM), which is reflective of the Museum’s regular visitors (J. Gray, personal conversation, March 24, 2013). Additionally, in questions one and two, the majority of participants indicated that they visited the Museum regularly; 53% had visited the Museum over two times in the last year, and 70% visited the Museum at least four times in the last 10 years. Sixty-four percent of these participants do not currently have a Museum pass and have never had a pass.

Interest and program outcomes. Encouraging visitors to explore the outdoors and fostering a connection with nature are two of the main outcome of the EYES in Winter program. The greater portion of the participants currently enjoy outdoor activities. Fifty-one percent of
respondents participated in outdoor activities one to three times per week and 28% indicated that they participated in outdoor activities daily. Ninety-one percent of the respondents stated a seasonal preference, where summer was the favoured season for outdoor activities; only 50% liked to participate in winter outdoor activities. Participants listed walking, including hiking, as their most popular outdoor activity at 37%; the other favourite outdoor activities included: swimming, free play with children and/or pets, visiting a park or playground, and nature related hobbies. Nevertheless, 61% of participants strongly agreed that they would like more opportunities that would encourage them to spend time outdoors. A few commented that the Museum should provide opportunities to experience the outdoors. For one example, one participant suggested that “offsite programs would be helpful (e.g. a session starting at the museum and moving to one of the Provincial Parks for follow up and discovery)”. Another participant noted “I take my kids to the Frog Pond and Point Pleasant [Park] often, [and] would love to have a children's nature walk at one of these with someone who could accurately answer all my kids’ nature questions and encourage their curiosity”.

Additionally, since the data was available, I conducted comparisons between frequency of visitation and interest in outdoor activities. I compared how many times the participants visited the Museum in the last year (i.e. never, once, 2-5 times, and over 5 times) with how often they participated in outdoor activities, which season(s) they preferred, and if they would like to have more opportunities that would encourage them to spent time outdoors. After calculating the visitation frequency percentages for each question, I found that there were no distinctive patterns to warrant further investigation at this time.

The majority of participants feel that people have lost their connection with nature due to an increased urbanization, with most participants strongly agreeing (50%) or agreeing (34%)
with this statement. In addition, most participants believe it is important to have a connection with nature; 75% of the participants strongly agreed and 22% agreed with this idea.

Furthermore, 76% strongly agreed that there are mental and physical health benefits provided by connecting with nature. Chi square tests revealed that there was a significant difference between the number of participants who agreed and disagreed with all the statements relating to their interests in outdoor activities and gaining a connection with nature in question 13; in all the statements, the number of participants who agreed were significantly greater than those who disagreed, as shown in Table 1.

In the additional comments section, one participant stated that even though outdoors was the best place to connect with nature, the Museum could provide their family with an appreciation of nature. Most respondents thought (68% strongly agreed and 28% agreed) that it was important for the Museum of Natural History to foster an appreciation of nature. This view was reinforced by a few of the other comments. Unfortunately, 89% of respondents admitted that they did not participate in the new EYES in Winter public program in the Nature Lab. However, 33% still strongly agreed and 50% agreed that attending a Museum program could help them connect with nature.
Table 1

Participants’ Interests in Outdoor Activities and Gaining a Connection with Nature

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Disagree</th>
<th>Total</th>
<th>Chi Square Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I would like to have more opportunities that would encourage me to spent time outdoors.</td>
<td>189</td>
<td>4</td>
<td>193</td>
<td>177.0*</td>
</tr>
<tr>
<td>b. Due to an increase in population in cities, people have lost their connection with nature.</td>
<td>162</td>
<td>30</td>
<td>192</td>
<td>90.8*</td>
</tr>
<tr>
<td>c. I believe it is important to have a connection with nature.</td>
<td>186</td>
<td>6</td>
<td>192</td>
<td>168.8*</td>
</tr>
<tr>
<td>d. By connecting with nature, I can improve my mental and physical health.</td>
<td>187</td>
<td>5</td>
<td>192</td>
<td>172.5*</td>
</tr>
<tr>
<td>e. I think it is important for the Museum of Natural History to foster an appreciation of nature.</td>
<td>186</td>
<td>5</td>
<td>191</td>
<td>171.5*</td>
</tr>
<tr>
<td>f. By attending a Museum program, I believe the Museum of Natural History could help me connect with nature.</td>
<td>158</td>
<td>33</td>
<td>191</td>
<td>81.8*</td>
</tr>
</tbody>
</table>

*p value = < 0.0001

Note: Online survey participants were asked to indicate how strongly they agreed with these statements to assess their interests in outdoor activities and gaining a connection with nature. These are the agree and disagree groups used in the statistical analysis and the chi square results.
**Audience.** “The Museum of Natural History is a great place to take children—for 15 minutes or two hours”, one participant commented, highlighting the potential for families to be the main audience for the EYES program. In fact, 68% of participants maintained that they visited the Museum with their family, which included children younger than 12 years of age, and in the additional comments section, 39% mentioned visiting the Museum with their families. Several respondents added comments that supported programming for children. Additionally, most of the participants strongly agreed or agreed with the statement “I like to share my interests with others and help them learn new things”, as shown in Table 2. Thus, most of the participants are *facilitators* as described by Falk and Storksdieck (2010); as museum visitors, facilitators are socially motivated and their visit is focused on primarily enabling the experience and learning of others, which can be typical of most parents who visit a museum with their children. This data suggests that the program must be suitable for families.

The survey responses also suggest a need to vary the program activities and topics over time in order to maintain participant interest. The majority of participants also identified themselves as *explorers* and strongly agreed or agreed that they were curious about natural history and liked to discover new things (Falk & Storksdieck, 2010). Almost all the participants stated that they liked to see new exhibits; suggesting that they are at some point in their visits they are acting as *experience-seekers* (Falk & Storksdieck, 2010). Statistical analysis indicated a significant difference between those who agreed and disagreed with all of the motivation statements, as shown in Table 2. Other potential audiences listed in the additional comments section included students, including home-schooled students, and children with mental disabilities.
## Table 2

*Potential Personal Motivations for Visiting the Museum of Natural History*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
<th>Chi Square Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I am curious about natural history and like to discover new things.</td>
<td>63%</td>
<td>34%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>174.7*</td>
</tr>
<tr>
<td>b. I like to share my interests with others and help them learn new things.</td>
<td>45%</td>
<td>38%</td>
<td>16%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
<td>84.5*</td>
</tr>
<tr>
<td>c. I have an interest in specific natural history topics and I would like to learn more about them.</td>
<td>33%</td>
<td>32%</td>
<td>31%</td>
<td>3%</td>
<td>1%</td>
<td>1%</td>
<td>18.9*</td>
</tr>
<tr>
<td>d. I like to relax and reflect as I walk through the exhibits.</td>
<td>40%</td>
<td>39%</td>
<td>18%</td>
<td>3%</td>
<td>0%</td>
<td>2%</td>
<td>63.0*</td>
</tr>
<tr>
<td>e. I like to see new exhibits.</td>
<td>77%</td>
<td>23%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>193.0*</td>
</tr>
</tbody>
</table>

*p value = < 0.0001

Note: Online survey participants were asked to indicate how strongly they agreed with these statements to assess their potential motivation for visiting the Museum.
Effective resources use. The online survey provided information on how the Museum could effectively use its resources in the design of the new public program. Included are the topics visitors expressed interest in learning and how they prefer to share their observations.

Topics and interests. In the survey, participants were asked to indicate which topic(s) interested them from a given list. Respondents could select more than one topic. The respondents were also given space to add their own ideas for topics. Sixty-five percent of participants stated that they have an interest in specific natural history topics and would like to learn more about them. These participants demonstrated their interest in a wide variety of natural history topics, as shown in Figure 3, especially marine life at 11% of the total number of responses, mammals (10%), astronomy (10%) and animal signs (10%). Participants were the least interested in rocks (6%) and mushrooms (5%), however, all the interests were closely ranked. Other interests suggested in the additional comments section were: dinosaurs (including paleontology) ranked at 15%, plants (edible or medicinal) at 9%, animal behavior (survival, seasonal) (6%), and evolution (6%). In the comments, similar interests were stated including - dinosaurs, fossils, astronomy, and native Nova Scotia species.

To connect visitors with nature, offsite field trips, public programs in the Museum’s backyard, and citizen science projects were suggested by participants. For example, one participant mentioned that she and her children enjoyed the nature hike led by a Museum staff member in the fall of 2011. In addition, 29% of the participants’ comments included their interactions with live animals at the Museum and how these interactions enriched their experience.
Sharing observations. Visitors sharing their nature observations with the Museum is a key aspect of the EYES program and they were asked to share their observations by mail, email, Facebook, Twitter, or in person. In the online survey, participants were asked how they preferred to communicate ideas. Analysis of the results showed that there was a statistically significant difference between participants who agreed and who disagreed with the statements provided, as shown in Table 3. Participants indicated that they liked to communicate ideas through social media (e.g. Facebook, Twitter, and Blogs) with 31% strongly agreeing and 43% agreeing to the statement provided. However, when asked about which specific communication tools they liked to use, 84% participants emailed daily, 82% participants used Facebook daily,
but 55% of the participants did not use Twitter and 52% did not blog. Thirty-six percent strongly agreed and 41% agreed that they were comfortable using social media to share ideas about natural history. A few visitors even commented that they would like more interaction with the Museum via social media, including sharing information about seasonal nature phenomena they could observe. When asked if they liked using internet sources to learn about natural history topics, 35% of participants strongly agreed and 53% agreed. In the comments, a participant stated that the Museum’s website is “the best and fastest place to find information” on natural environments in Nova Scotia.

Under additional communication tools that they used and most liked to communicate ideas, 27% of participants listed face to face interaction, with 33% of the participants choosing this solution strongly agreeing and 45% agreeing to the statement that they “like to communicate ideas” this way. As expected with the advance of communication technologies, mail was used the least by participants overall—3% reported using mail on a daily basis and 12% reported 1–5 times per week.
Table 3

Participants’ Communication Preferences

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Disagree</th>
<th>Total</th>
<th>Chi Square Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I like to communicate ideas through face to face interaction.</td>
<td>149</td>
<td>43</td>
<td>192</td>
<td>58.5*</td>
</tr>
<tr>
<td>b. I like to communicate ideas through social media (e.g. Facebook, Twitter, and Blogs).</td>
<td>140</td>
<td>50</td>
<td>190</td>
<td>42.6*</td>
</tr>
<tr>
<td>c. I am comfortable using social media to share ideas about natural history.</td>
<td>146</td>
<td>43</td>
<td>189</td>
<td>56.1*</td>
</tr>
<tr>
<td>d. I like to use internet sources to learn about natural history.</td>
<td>169</td>
<td>22</td>
<td>191</td>
<td>76.4*</td>
</tr>
<tr>
<td>e. Visiting an institution, like a museum, is the best way to learn about natural history.</td>
<td>143</td>
<td>49</td>
<td>192</td>
<td>46.0*</td>
</tr>
</tbody>
</table>

*p value = < 0.0001

Note: Online survey participants were asked to indicate how strongly they agreed with these statements to assess their communication preferences. These are the agree and disagree groups used in the statistical analysis and the chi square results.
Using the Nature Lab for public programs. Only 23% of participants indicated the correct location of the Nature Lab as being by the Netukulimk exhibit on the main level, and 48% acknowledged that they were not familiar with where it was located. “I go to the museum with the kids all the time and never knew about the lab this survey refers to”, stated one participant. As for public programs in the Nature Lab, 69% of the participants did not know that they could participate in Nature Lab programs. In 19% of the additional comments, participants mentioned a lack of information about the Museum and its public programs; one participant commented on the fact that there is no information about the Nature Lab on the museum website. In spite of this lack of information, 20% of the participants indicated that they and/or their family had participated in a public program in the Nature Lab and 10% indicated that they and/or their family had participated in the new EYES in Winter public program. On the other hand, the participants were familiar with Museum exhibits and other public programs such as Wee Wild Ones, a nature-based program for preschoolers. In 52% of the comments, participants provided feedback on specific permanent exhibits, such as Netukulimk, and past travelling exhibits, like Out of this World, a science-fiction costume exhibition from the summer of 2012.

Perceived value of the Museum and its programs. “Love” was one of the keywords I examined in the qualitative analysis. In 44% of the additional comments, participants used the word “love” as a way to express their feelings about the Museum and its programs. For example, one participant stated, “I absolutely love the beautiful museum we have here in Halifax!” In fact, I observed that 81% of the comments were positive and only 8% were negative. Almost all of the participants expressed the view that visiting the Museum was an enjoyable experience and that they planned to return. There were a few comments about how the staff enhanced their experience through their face-to-face interactions with them by being both
knowledgeable and helpful. From the additional comments, the Museum is seen as a source for fun educational experiences, especially for families. A participant conveyed the opinion that the Museum was a good place to share memories with their children. Participants felt that visiting an institution, like a museum, was the best way to learn about natural history, with 31% in strong agreement and 44% agreed.

**Program Observations**

According to the Museum’s visitation statistics, 6551 people visited during the trial program period. Unfortunately, statistics were only available for the total daily visitation. Since daily visitation patterns during the day are not consistent, it was not possible to determine the number of visitors in the museum during the two hour program period. Therefore, I will mainly focus on the observations I recorded in the Nature Lab and be limited to general comparisons with the total visitation. Five hundred and sixty-four visitors voluntarily participated in the trial program and the following observations were recorded.

**Program outcomes.** Assessing the impacts of informal free-choice learning environments such as museums can be challenging; changing knowledge, attitudes, and behaviours is not instantaneous and involves many external factors (Storksdieck et. al., 2005). Visitors’ encounters with programs and exhibits are limited (Storksdieck et. al., 2005). Therefore, it is difficult for me to determine if visitors were actually encouraged to explore their local natural environment and possibly connect with nature by participating in the EYES in Winter program. However, learning cannot occur without engagement (Rennie & Johnston, 2004). Therefore, if the visitors participated in the program and were engaged, there is a potential opportunity for change. To determine the fulfillment of program outcomes, I examined the visitors’ participation in the program and their interest in the topics and activities.
Table 4

*Daily Comparison between Nature Lab Visitors and Program Participants*

<table>
<thead>
<tr>
<th>Day</th>
<th>Entered the Nature Lab</th>
<th>Program Participants</th>
<th>% Participation</th>
<th>% Total Participation per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday</td>
<td>345</td>
<td>282</td>
<td>82%</td>
<td>50%</td>
</tr>
<tr>
<td>n = 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>283</td>
<td>226</td>
<td>80%</td>
<td>40%</td>
</tr>
<tr>
<td>n = 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>68</td>
<td>56</td>
<td>82%</td>
<td>10%</td>
</tr>
<tr>
<td>n = 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>696</td>
<td>564</td>
<td>81%</td>
<td>-</td>
</tr>
<tr>
<td>N = 22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note.  

- n = Number of days.  
- N = Total number of days.  
- % Participation = the percentage of Nature Lab visitors who chose to participate in the program for each day it was offered.  
- % Total Participation = the total participation for day the program was offered as a percentage of the total participation for the test period.

*Program participation.* During the program test period, 696 visitors entered the Nature Lab and 564 of these visitors chose to participate in the EYES in Winter program; this is an 81% participation rate as shown in Table 4. The perceived ages of the program participants were recorded and the results are shown in Figure 4. Children estimated to be aged 6 to 11 years and adults estimated to be aged 25 to 64 years characterized the majority of the participants.
These age distributions are comparable to the ages of the total museum visitor population over the seven weeks; the visitor population for the Museum consisted of 43% adults and 53% children, as demonstrated by Table 5. Though the main audience seemed to be families with children, I identified other potential audiences to consider that included: birthday parties, youth adults, Brownie and Cub groups, and the Young Naturalist Club.
Table 5

Comparison of the Ages of the Program Participants and Museum Visitors

<table>
<thead>
<tr>
<th>Age Group (N = 22)</th>
<th>% Program Participants</th>
<th>% Museum Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child (Age 0 - 17)</td>
<td>53%</td>
<td>44%</td>
</tr>
<tr>
<td>Adult (Age 18 - 64)</td>
<td>43%</td>
<td>55%</td>
</tr>
<tr>
<td>Senior (Age 65+)</td>
<td>4%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Note. N = Total number of days. Age Group = program perceived age groups: young children and children, and young adults and adults were combined to create the age groups: child and adult are comparable to the museum visitor ages collected by Visitor Services. % Participation = the participants’ age groups as a percentage of the total of 542 participants recorded. % Museum Visitation = age group of the museum visitors as a percentage of the total number of museum visitors.

Interest in program topics. From my general observations, visitors seemed to enjoy participating in the program and showed interest in all three topics: birds, trees, and animal signs. As presented in Table 6, Trees in Winter had the highest rate of participation of the three topics with 84% of the visitors trying one of the activities. This rate was closely followed by Animal Signs with a participation of 83%. Birds in Winter received the lowest participation rate of 71%; as shown in Table 6, Birds in Winter also had the lowest number of participants overall. However, program days featuring birds represented three of the lowest total museum visitation. For example, on February 3, 2013, the Museum received 44 visitors, the lowest number of overall visitation days at the museum, and there were no program participants. Overall, the age was not a factor in program topic preference. Although, young children had their highest participation during the Animal Signs program topic with 20%.
### Table 6

**Comparison of Visitor Participation by Program Topic**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Enter Nature Lab</th>
<th>Program Participants</th>
<th>% Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds in Winter</td>
<td>133</td>
<td>95</td>
<td>71%</td>
</tr>
<tr>
<td>n = 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trees in Winter</td>
<td>255</td>
<td>213</td>
<td>84%</td>
</tr>
<tr>
<td>n = 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Signs</td>
<td>308</td>
<td>256</td>
<td>83%</td>
</tr>
<tr>
<td>n = 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>696</strong></td>
<td><strong>564</strong></td>
<td><strong>81%</strong></td>
</tr>
</tbody>
</table>

_Note. n = Number of days. N = Total number of days. % Participation = the percentage of visitors who entered the Nature Lab and participated in the EYES in Winter program for each topic offered._

**Activity participation.** The EYES in Winter program featured three different types of programs: explore, observe, and investigate/experience. The data for the activities is featured in Table 7. Investigate/experience activities, such as the *Evergreen Challenge* in Trees in Winter, where participants were asked to identify their favourite conifer scent, and *Mystery Animals* in Animal Signs, where participants tried to identify an animal by its tracks, browse, or scat, were the most popular with visitors, with 51% demonstrating an attraction to these types of activities.
Table 7

*Percentage Distribution of the Visitor Participation in the Different Types of Program Activities*

<table>
<thead>
<tr>
<th>Topic</th>
<th>Explore</th>
<th>Observe</th>
<th>Investigate/experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds in Winter</td>
<td>n = 6</td>
<td>n = 6</td>
<td>n = 6</td>
</tr>
<tr>
<td>% Participation</td>
<td>48%</td>
<td>35%</td>
<td>17%</td>
</tr>
<tr>
<td>Trees in Winter</td>
<td>n = 18</td>
<td>n = 9</td>
<td>n = 9</td>
</tr>
<tr>
<td>% Participation</td>
<td>32%</td>
<td>14%</td>
<td>53%</td>
</tr>
<tr>
<td>Animal Signs</td>
<td>n = 16</td>
<td>n = 8</td>
<td>n = 8</td>
</tr>
<tr>
<td>% Participation</td>
<td>31%</td>
<td>8%</td>
<td>61%</td>
</tr>
<tr>
<td>Total Participation</td>
<td>N = 40</td>
<td>N = 23</td>
<td>N = 23</td>
</tr>
<tr>
<td>% Total Participation</td>
<td>34%</td>
<td>15%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Note. n = Number of times the activity type was offered. N = Total number of times the activity type was offered. % Participation = participation in each type of activity as a percentage of the total participation in each topic offered. % Total Participation = total participation in each type of activity as a percentage of the total participation in each activity type.

Often visitors were invited to start with these activities and then they would be more open to participate in the other activities. Observe activities showed the lowest attraction by visitors at 15%. The exceptions were the Birds in Winter’s explore and observe activities which showed the highest participation with 48% and 35% respectively. The investigate/experience activity from Animal Signs had the highest overall participation rate at 61%.
**Post-visit activity sheets.** During the trial public program, 49 activity sheets were taken by visitors; about 9% of the participants took an activity sheet. Eighty percent of the sheets taken were the Winter Nature Bingo sheets over the abridged version with only the sharing information. Program topic or location in the Nature Lab did not seem to influence the number of sheets taken by visitors. According to the calculated percentage of sheets taken by participants, Animal Signs had the least amount with 8%; slightly lower compared to the highest, 10% during Birds in Winter.

**Observations shared.** The activity sheets invited visitors to share their nature observations with the Museum and provided instructions on the several methods: mail, email, Facebook, Twitter or in person. During the program, if the visitor enquired about the program’s purpose or the activity sheet, they were informed about their option to share their nature observations with the Museum. Additionally, if the visitor shared a nature observation from a previous experience, they were encouraged to share future observations with the Museum. Over the seven weeks, visitors did not share any nature observations through mail, email, Facebook, Twitter, or in person.

**Effective resource use.** The program observations provided valuable information on the where the Museum resources should potentially be allocated concerning program scheduling and facilitation.

**Scheduling.** As shown in Table 4 (see page 66) and Figure 5, Saturday’s program received the highest number of participants, 282 visitors, which is 50% of the total program participation. Wednesday’s programs received the lowest number of participants with 56 visitors or 10% of the total number of program participants. As exhibited in Table 8, the age participation rate per day yielded a similar frequency distribution as the total age participation,
with the exception of the young adult group, which showed a slightly higher visitation rate on Wednesday evenings with a rate of 11%; one of the factors for this higher visitation rate could be the free admission on Wednesday evenings.

Figure 5. Daily Comparison of the total number of Nature Lab visitors and program participations.
Table 8

Comparison of the Program Participant Ages Percentages by Day

<table>
<thead>
<tr>
<th>Age</th>
<th>Saturday n = 7</th>
<th>Sunday n = 8</th>
<th>Wednesday n = 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young Child (Ages 0 – 5)</td>
<td>16%</td>
<td>12%</td>
<td>34%</td>
</tr>
<tr>
<td>Child (Ages 6 – 11)</td>
<td>30%</td>
<td>32%</td>
<td>14%</td>
</tr>
<tr>
<td>Teenager (Ages 12 – 17)</td>
<td>7%</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>Young Adult (Ages 18 – 24)</td>
<td>4%</td>
<td>6%</td>
<td>11%</td>
</tr>
<tr>
<td>Adult (Ages 25 – 64)</td>
<td>38%</td>
<td>37%</td>
<td>36%</td>
</tr>
<tr>
<td>Senior (Ages 65 +)</td>
<td>5%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Note. n = Number of Days. % Participation = perceived age groups of the participants as a percentage of the total participation for each day the program was offered. Sunday’s participation percentages are based on a total of 204 participants due to the 3.9% of perceived ages that were not recorded.

Program facilitation. All the program topics required a high degree of facilitation by staff even though the activity instructions were provided. Frequently, I used one of the activities, such as the Evergreen Challenge, to engage visitors and generate interest in the other activities. However, a few times, I observed adults providing facilitation for children and even children playing facilitators for children from other groups; for example, children helped guide other children through the Mystery Animal activity. In Trees in Winter, I observed more self-direction employed by visitors; in that program, fewer specimens and props were set up on the table,
therefore, the activity stations were better defined and possibly easier for visitors to follow. Due to lack of space, the Scat and Browse activities were set up on the far side of the table and received lower participation than the Mystery Animals; Figure 6 shows the set-up of the Animal Signs program. On most days, once a visitor was aware of an activity, they would spend time at the activity station.

*Figure 6.* The four Animal Signs activities, for the EYES in Winter public program, set-up on both sides of the center counter. Picture taken by Heather McKinnon Ramshaw, January 2013.
Magnifying glasses at several stations allowed visitors to closely examine the specimens and increased their engagement especially at the *Tree Rings*, *Twig ID*, and *Birds’ Nests* stations. Another successful program prop was the touch boxes. A few visitors were nervous, at first, to put their hands in the boxes, but all seemed to enjoy touching the contents and speculating about their origins. Both staff and visitors seemed to enjoy choosing their favourite conifer scent in the *Evergreen Challenge*. All activities were suitable for all ages; even though winter deciduous tree identification can be challenging at any age, children were able to complete the activity by matching the twig specimen with the picture. Despite the general success of the activity, I observed the *Loves, Hates, or Tolerates* from *Birds in Winter* did not work as well as the others. This activity concept was too complex and took too long to explain to visitors; yet, visitors seemed to enjoy examining the mounted bird specimens.

**Using the Nature Lab for public programs.** To inform visitors that the Nature Lab was open and to invite them to participate in the public program, the television monitor above the Nature Lab window showed a promotional video. There was a sign inviting them to participate in the program evaluation placed outside the door and, commencing the second weekend, an “OPEN” sign was placed in the open Nature Lab window. In addition, an announcement was made which invited visitors to the Nature Lab each time the program was about to start. Despite these efforts, visitors were still unsure if they were permitted to enter the Nature Lab, and needed to be invited and engaged by the facilitator. From outside the Nature Lab, the program materials on the center counter cannot be seen and most visitors seemed to be under the impression that it was only a staff work space. From observations of the visitors in the Netukulimk exhibits beside the Nature Lab, the Nature Lab is not part of the natural path for visitors; visitors in the Netukulimk exhibit do not seem to see the Nature Lab and after walking around Netukulimk
exhibit, walk straight up the ramp to the other galleries. In addition, although there could have possibly been more, I noticed that two visitors were deterred by the “program evaluation” sign.

**Traffic flow and setting.** The Nature Lab is a dead end; it only has one door. Hence, visitors entering and exiting the space can create congestion at the doorway. Often, participants would accidentally block the door and prevent other visitors from entering. Additionally, the limited space inside made it difficult for visitors to move around and access all the activity stations. Visitors cannot walk around the stainless steel center counter, since one end is against the window. On occasion, one adult would come in with several children and the other adults from the same group would choose to wait outside and watch through the window. The lack of fluidity of movement made facilitation challenging at times, especially when two separate groups arrived at the Nature Lab at the same time. I would have to awkwardly address the two groups at the doorway, resulting in a little confusion, and some visitors would choose not to participate. Furthermore, if a second group arrived a little after the first group, it was difficult to make the second group feel welcome while still engaging the first group. Lastly, the two large external windows permit an excessive amount of sunlight into the Nature Lab. Although the natural light can be beneficial, the sunlight, enhanced by insufficient ventilation, causes the temperature to rise in the Nature Lab. According to the digital thermometer, it was 30°C in the Nature Lab on the afternoon of February 2, 2013; many visitors complained about the heat and it shortened their stay.

**Live animal displays.** Live animals are on display in the Nature Lab, including crickets, feeder fish, mealworms, and various animals brought to the Museum through the Enquiry Program. The displays constantly change, depending on the availability and the season. Most visitors showed a great interest in the animal displays. Some visitors were familiar with the
animals from a previous visit and returned to the Nature Lab for another view. At the time of the program, there was a mouse on display, which was a great attraction for the young children. In addition, visitors shared positive feedback about the other animal displays in the Museum, including “Gus” the gopher tortoise.

Study Limitations

**Low visitation.** Museum visitation can depend on many different factors such as the popularity of current exhibits, other local events, and weather conditions. Naturally, program participation depended upon museum visitation; low museum visitation resulted in low program participation. At the time of the observation period, a Little Ray’s Reptiles exhibition, which is a visitor favourite, was being presented. Although it increased the visitation rate for the Museum, the show times conflicted with the program, ironically, it possibly caused a drop in program participation. During the winter months, especially January and February, poor weather conditions can be expected in Nova Scotia. Heavy snowfall caused a few days of low visitation when EYES in Winter was scheduled. The Museum was closed on Saturday, February 9, 2013 due to poor weather conditions and was not included in this study.

**Issues with data collection.** During the course of this study, I had several issues collecting the data, including missed observations and visitation statistics. Due to unforeseen staff shortages, I had to facilitate the public program and record observations simultaneously. Although both tasks were essential for the success of this study, it was challenging to devote my full attention to both tasks and I failed to record a number of potential observations. For instance, I was unable to naturally engage visitors in conversations about the program and record their comments. Additionally, at times when the Nature Lab was busy, I missed recording the perceived ages of a total of 4% of the visitors, and an estimated 21% of the activities in which
they participated, based on the total participation in the most popular activities. Finally, Visitor Services was not able to provide the visitation statistics specifically for the hours the program was scheduled. In addition, because of computer issues, the visitation statistics from February 27, 2013 were inaccessible.
Chapter Five: Discussion

Study Summary

Over a two month period, a formative evaluation of the public program, Exploring Your Extraordinary Surroundings (EYES), was conducted at the Museum of Natural History in Nova Scotia. Consisting of an online survey and onsite observations during the program, this assessment contained elements from both a front-end and a formative evaluation to provide a broader perspective and to aid in the interpretation of the results. Designed to assess the public’s potential interest in this type of nature observation program, the evaluation also recorded the visitors’ reactions to a pilot version of the program—EYES in Winter. Overall, the evaluation indicated positive responses from visitors and revealed that visitors would be interested in this type of program. Therefore, further program development would be worthwhile. The assessment examined the following:

• If visitors are interested in participating in this type of nature observation program;
• If the program design could result in the intended outcomes—to encourage visitors to explore their natural environments and share their observations with the Museum;
• How Museum resources could be used effectively toward the fulfillment of the outcomes;
• If the Nature Lab functions as a programming space and whether possible improvements should be made to this area.

This chapter outlines the findings and the resulting recommendations for the program’s continued development which concerns the public’s need for the program, successful design elements, improvements for the Nature Lab, and suggestions for program logistics. In addition, future implications and research will be discussed.
Findings and Recommendations

**Interest in the EYES program.** With an increase in development of urban areas and dependence on technology, the gap between humans and nature is rapidly growing (Louv, 2005). Nature can have a beneficial effect on our mental and physical well-being (Louv, 2005). Spending time in nature can also help us develop environmental values and an appreciation for this life support system that is critical for our survival (Falk et al., 2007). In the response to the current concern about nature-deficit disorder, I believe that the Museum of Natural History can play an important role by providing meaningful experiences that help its visitors re-establish this connection with nature, especially for those living in urban areas. Encouraging the public’s understanding and appreciation of the natural world is part of the mandate of the Museum (Nova Scotia Museum, 2009). Even though there are societal benefits and institutional supports for a nature observation program like EYES, its success depends on visitors’ interests and whether or not they see value in their participation (Allen, 2004). To successfully make a positive impact in the lives of their visitors, the Museum needs to better understand how to align its goals with its visitors’ interests (Falk & Storksdieck, 2010).

The evaluation completed for this thesis revealed that there would be public interest and support for a nature observation program, like EYES. According to the online survey results, the majority of the participants felt that people have lost their connection with nature due to increased urbanization and that regaining this connection is important for their mental and physical health. Furthermore, most survey respondents thought it was necessary for the Museum of Natural History to foster an appreciation of nature and that a Museum program could help reconnect them with the natural world. During the trial EYES in Winter program, 81% of the visitors who entered the Nature Lab chose to participate in the EYES activities, thus indicating
their interest in the program. In addition, based on their reactions and participation, visitors seemed to enjoy the activities.

Encouraging people to go outdoors in nature and become more aware of their surroundings can help them reconnect them with nature (Louv, 2005). The majority of the online survey participants currently enjoy outdoor activities such as walking and hiking. Therefore, the Museum can naturally guide visitors to take the next step toward a greater awareness of and interest in nature. Museums have a strong ability to build on their visitors’ past experiences, strengthening and expanding existing values (Weil, 2002). If most respondents did not participate in outdoor activities, it would be more difficult for the Museum to encourage nature exploration that would lead to a change in their behaviors (Capra, 1996).

Even though most participants listed more urban-based outdoor activities such as free play with children and/or pets and visiting a park or playground, the online survey results demonstrated that these individuals would be open to new nature experiences. The survey results indicated that the respondents would like more opportunities that would encourage them to spend time outdoors and a few suggested that the Museum should provide these opportunities. For the trial public program, I created two types of post-visit activity sheets. Only 9% of the participants took an activity sheet during the trial period. However, during March Break week, a version of the EYES in Winter program was offered outside the Nature Lab and the Winter Nature Bingo activity sheet was offered to visitors. Over the course of this high visitation event, over 100 sheets were taken by visitors. Based on the number of sheets taken, the visitors preferred the Winter Nature Bingo activity sheet over the abridged version with only the sharing information. This preference demonstrated not only their desire to explore nature, but that they were also likely to be interested in having opportunities to spend more time outdoors.
**Program design.** The formative evaluation provided valuable information to aid in the design of an effective program relating to audience, program outcomes, topics, activities, visitor orientation, and scheduling.

**Audience.** Families with young children constitute the greater part of the Museum’s regular visitors (J. Gray, personal conversation, March 24, 2013). Naturally, in the development of the trial EYES in Winter program, I designed the activities with this group in mind. My assumption was confirmed by the program observations and the survey results. Most of the people interested in participating in the survey visited the Museum regularly with their families and for 68% of the respondents, their family included children who were under 12 years of age. In addition, since the respondents represented those who would be more likely to participate in and benefit from the EYES program, they demonstrated the relevancy of the survey. Likewise, the majority of participants observed in the trial public program were adults with children. However, the open-ended responses from the survey participants indicate that a few participants would appreciate programming specifically aimed at students, including home-schooled students, and children with mental disabilities. In the future, as the program becomes more established, the Museum may look at generally encouraging participation from a broader demographic: teenagers, young adults, and seniors could be considered once the program is established.

One of the questions in the online survey was designed to determine the participants’ motivations for visiting the Museum. Responses to this question indicated that most of the participants are facilitators and explorers; therefore, they like to learn new things and share their interests with others (Falk & Storksdieck, 2010). In addition, all the participants stated that they liked to see new exhibits which could identify them as experience-seekers. To accommodate
visitors’ motivations, the new program has to provide interesting natural history stories for the explorers; resources and opportunities for the facilitators to share their interests with others, plus the program has to stay fresh for the experience-seekers.

**Program outcomes.** Through hands-on experiences with specimens, the EYES in Winter trial program was designed to provide visitors with a better understanding of local natural history and to encourage them to make their own nature observations. Visitors were invited to share their nature experiences and observations with the Museum during a return visit or through social media. In addition, by participating in the program, visitors could develop observation skills and gain experience making natural history records. Yet unless you can observe the visitors after their limited exposure to the program (Rennie & Johnston, 2004), determining if a museum program has affected a visitor’s knowledge, attitudes, or behaviours in any way is challenging (Storksdieck et. al., 2005). However, Falk and Storksdieck (2010) found that 2 years after their initial science center visit, visitors were still strongly influenced by their experience.

One of the challenges presented in this program evaluation was that none of the participants in the pilot program shared their post-visit nature observations with the Museum. This lack of post-visit feedback made it difficult to determine whether or not program participants took later actions as a result of their participation in the EYES program. However, other factors indicate that there is still potential for the intended program outcomes to be successfully achieved. For example, we know that opportunities for change start with engagement (Rennie & Johnston, 2004). Since the EYES program offers opportunities for participant engagement, the survey participants demonstrated an interest in this type of program, and observations in the Nature Lab showed that participants were engaged in the program. I concluded that the pilot program has the potential to lead participants to later actions, even if
they did not provide this feedback to the Museum. Additionally, while participants did not share post-visit observations during the program trial period, they did enjoy sharing their past nature experiences with staff while visiting the Nature Lab. Finally, a few of the survey respondents commented that they would like more interactions with the Museum via social media, including sharing information about seasonal nature phenomena.

The results of the program evaluation indicate that while there is potential interest by visitors to share their post-visit nature observations, this program objective was not achieved. Most of the survey respondents indicated that they were comfortable sharing ideas about natural history through social media and most preferred to use Facebook over Twitter and blogs. The lack of follow-up might be derived from the fact that few of the program participants took activity sheets, which contained the information on how to share future nature observations. Therefore, I would recommend more promotion on the sharing aspect of the program. One possibility of increasing sharing is to use the Museum’s Facebook page to encourage people to share their nature observations and, at first, request a specific observation (e.g. first Robin of spring sighting) until the public becomes accustomed to sharing. The post-visit activity sheet could also be made available online through the Museum’s website. The online and onsite components of the program would promote and complement each other; however, the online component could potentially play a larger role. In addition, offsite field trips, suggested in the online survey, could support the online and onsite components, as well as, actually connecting the public to the natural world.

**Interests and activities.** Museums allow visitors to explore their own interests and through their activity selections to create their own experiences (Falk, 2005) which can potentially impact their attitudes and behaviors (Falk et al., 2009). Given that the visitors’
participation is voluntary and their attention depends on their interest, aligning the EYES program topics with the visitors’ interests is essential (Allen, 2004). Fortunately, both the program observations and online survey indicated that the public was interested in a broad range of natural history topics. For all three topics: birds, trees, and animal signs, there were no significant differences with the rates of participation in the trial program. Similarly, in the online survey, participants expressed an interest in a number of natural history topics including: paleontology, marine life, mammals, and astronomy. This wide range of interests could signify the audience has a willingness to learn new ideas which opens many possibilities for the EYES program.

Activities. In the EYES in Winter program, there were three or four activities for each of the three program topics; these activities were categorized into three types of activities: explore, observe, and investigate/experience. All the activities were interactive and hands-on with the intention of engaging visitors cognitively, emotionally and socially (Falk et al., 2009). The investigate/experience activities, such as the Evergreen Challenge in Trees in Winter, as shown in Figure 7, and Mystery Animals in Animal Signs, were the most popular with visitors. The popularity of these activities is possibly due to the facts that they were better at engaging the visitors’ senses, generating emotion, and providing opportunities for social interaction. For example, in the Evergreen Challenge, in choosing their favourite conifer scent, visitors not only used their sense of smell, but the scents might have also triggered memories of past experiences and places, such as their own backyards and Christmas holidays. While participating in this activity, visitors also would often discuss their preferences with their group members and encourage them to participate. Similarly, in the Mystery Animals activity, visitors had the opportunity to interact with real specimens from nature which inspired discussions about past
encounters with wildlife. Because the investigate/experience activities were found to provide a higher potential for full visitor engagement, future EYES programs will involve more of these types of activities. Additionally, magnifying glasses and touch boxes will be added to further aid in the visitors’ investigations. Similar to Allen’s (2004) “empty frog tank”, these activities do not have to be complex to be effective (p. 21).

Figure 7. The Evergreen Challenge activity from Trees in Winter, EYES in Winter. Picture taken by Heather McKinnon Ramshaw, January 2013.
Visitor orientation. The “immediate apprehendability” of program activities is important; visitors must be oriented within a comfortable framework in order to engage with the program material (Allen, 2004, p. 21). Allen (2004) suggested “user-centered design” as a way to achieve “immediate apprehendability” by using objects and simple activities that are intuitive to visitors; for example, activities that involve a specimen and a magnifying glass (p. 21). Allen’s ideas were found to have some validity in this program evaluation because the more popular investigate/experience activities relied less on knowledge-based responses than did the explore activities.

Overall, the activities in the EYES program were uncomplicated and, except for the Birds in Winter’s explore activity, asked visitors to either look, smell or touch. The Loves, Hates or Tolerates activity required visitors to use the information provided to decide if the four birds loved, hated, or tolerated winter. I often used this as the starter activity, which would explain the relatively higher participation rate in Birds in Winter. This activity required a significant amount of facilitation and visitor concentration to make it work; often participants were more interested in looking at the mounted bird specimens. In contrast, for another starter activity, Evergreen Challenge in Trees in Winter, visitors were asked to choose which conifer they preferred. This activity was easy for visitors to understand since it did not require any background knowledge or any significant amount of concentration by the visitors. The simplicity of the Evergreen Challenge was the key to its high participation rate and its success.

The bird activity in the EYES program for Summer 2013 will only include the mounted bird specimens for visitors to examine. Additionally, to ensure that the visitor does not become overwhelmed (Allen, 2004), fewer activities or better defined activity stations on the Nature Lab center counter may be beneficial. In the Animal Signs activity, the Scat and Browse activities
were set up on the far side of the table and were difficult to see because the Mystery Animals materials dominated the counter space; as a result, these activities received lower visitor participation than the Mystery Animals. If I were to do this activity again, I would use only one of the mystery animals or omit the scat and browse activities.

Instruction sheets were provided for each activity. To aid in a broader understanding of the activities, these sheets also included interesting facts or suggestions on further explorations after the participants’ visit. These sheets were helpful when I was unable to assist visitors and thus encouraged self-facilitation, being popular, in particular, for adults assisting children. Still, I found that visitors preferred that I guide them through the activities, especially for the first activity. In addition, the instruction sheets and the simplicity of the activities would enable easy training of staff and volunteers; a new facilitator could quickly understand the activity and how to assist visitors by reading the sheet.

**Scheduling.** Although instruction sheets for each activity were provided, the EYES trial program’s success depended upon facilitation by staff. As a result, at least one staff member or volunteer must be scheduled to facilitate the program in the future. The Museum received a higher total visitation on weekends resulting in higher program participation than on Wednesday evenings; therefore, it would be a better use of staff resources to schedule the program on weekends. The two hour length and afternoon time period worked well and should be continued. In addition, if possible, the program should not be scheduled at the same time as popular presentations such as the Little Ray’s Reptiles show.

**Program location.** As programming space, the Nature Lab has the potential to offer visitors valuable first-hand experiences with specimens, especially the live animals, and have informal intimate conversations with staff. However, this space lacks an “immediate
apprehendability” that invites visitors to explore the area and inspires their curiosity. The majority of the survey participants could not identify the correct location of the Nature Lab and did not know that they could participate in Nature Lab programs. During the trial public program, visitors were hesitant to enter the Nature Lab because they were under the impression that visitors were not permitted; even though there were signs posted inviting them into the space. As the facilitator, I needed to make the visitors feel welcome and comfortable before they would be open to engaging with the program materials. Allen (2004) noted that research had shown that visitors need to be comfortable and oriented before they can engage in a challenge.

To ameliorate the problems visitors had accessing and feeling comfortable in the Nature Lab, several strategies are recommended. Of immediate concern, the Museum needs to establish “clear scene setters” in regards to the Nature Lab and related programming (Goulding, 2000, p. 271). Two signs identifying the Nature Lab as a visitor area are recommended; one sign should be placed in front of the lab and the other sign should protrude from the wall so that it is visible from the ramp which leads visitors from the foyer to the galleries. Additionally, Nature Lab hours and programming should be posted outside the Lab, along with an “open/closed” sign. These signs would help visitors find and recognize the Nature Lab. Visitors would also have expectations about the type of experiences the Nature Lab has to offer and should be able to choose to include these experiences in their visit. To help visitors plan and navigate through their visit, the Museum needs to provide them with sufficient information about opportunities to participate in different activities, such as those in the new EYES program (Booth, 1998). Furthermore, information about the Nature Lab should be included on the Museum’s website, as suggested by a survey participant.
Traffic flow and Nature Lab layout. The overall traffic flow in the Nature Lab added to the visitors’ anxiety and confusion; these emotions can negatively impact willingness to learn new ideas (Kort et al., 2001). The visitors’ movements around the space became awkward due to the placement of the center counter and the size of the Nature Lab. Visitors may enter the Nature Lab through only one door and can then choose to walk down either the front side or back side of the center counter. One end of the center counter is against a window; therefore, visitors cannot walk around the center counter and instead have to backtrack to get to the other side. During the EYES program, visitors might have had trouble accessing all the activity stations because of the number of visitors in the Nature Lab. The maximum capacity of the lab appeared to be about ten people. Additionally, I observed congestion at the door where visitors already in the Nature Lab would unintentionally block other visitors from entering the space.

The design and decoration of museum spaces are a key part in the creation of the visitors’ experience (Lord, 2007); therefore, the Museum needs to change the office-like appearance of the Nature Lab. Design factors such as lighting, color, sound, and space size can influence visitor experience (Falk, 2004). An examination of the Nature Lab layout is recommended to improve the visitor’s continual flow and its use as a programming space. In addition, the décor of the Nature Lab must invoke the visitors’ curiosity to encourage them to enter the space and be open to learning. Finally, an examination of the Nature Lab’s ventilation is required to improve the air quality and temperature for the visitor’s comfort and the health of the live animals on display.

The EYES program in the Nature Lab. The Nature Lab was the intended location for the new EYES public program. Although there are some concerns with the space, this location does seem to be a good choice for the EYES program. As noted above, once they entered the
Nature Lab, most visitors did choose to participate in the trial public program. Visitors were only able to enter the Lab during the program time; the limited access to the space gave the visitors a sense of exclusivity and an expectation of a unique experience. However, to be successful, the program must meet this expectation and efforts have been made to provide visitors with a meaningful experience. The Nature Lab also offers an intimate environment for the EYES program where visitors have the opportunity to interact with staff individually, sharing their stories and asking their questions; these social interactions are important for generating an interest in natural history (Falk et al., 2009). In the online survey, participants saw value in communicating ideas through face to face interaction which is one of the main features of the EYES program.

Live animal displays are a key attraction in the Nature Lab and include the animals from the Enquiry program, such as native insects and spiders. To preserve the Museum’s natural history and cultural collection, live specimens, especially insects, should be kept in an isolated location like the Nature Lab. These live displays are popular with visitors and attract people to the Nature Lab. Hands-on experiences with live animals can potentially connect visitors to the natural world through their emotions (Kahn & Kellert, 2002), encouraging them to explore nature on their own (Falk et al., 2007). In addition to the preserved specimens, these live animals should be incorporated into the EYES program. Furthermore, information about the origin and natural history of these animals should be provided; not only will this information allow for interpretative opportunities, but visitors could be encouraged to make and share their observations with the Museum by seeing examples collected by other visitors. Kolan and Poleman (2009), Tallmadge (2011), and Fitzsimmons (2012) discussed the importance of
promoting the natural history practices, such as making observations, as a way to connect the people with nature.

**Future Implications**

“Natural history helps us see the world, and thus ourselves, more accurately. Moreover, it encourages and inspires better stewardship of the Earth” (Fleischner, 2011, p. 21).

Observation and awareness of natural phenomena, fundamental natural history practices, have been part of our daily lives for thousands of years; early humans depended on these skills for their survival (Fleischner, 2011). By continuing to promote this essential practice, the Museum of Natural History has an important opportunity to help narrow the growing distance between modern society and the natural world, especially for those living in urban areas (Falk et al., 2007). Nature is vital for the maintenance of our mind, body, and spirit (Louv, 2005).

According to the survey, the public sees value in the Museum and its programs; most participants agreed that visiting the Museum was the best way to learn about natural history and that it provided an enjoyable educational experience. To this end, the Museum can hope to make a positive contribution to the community and in the lives of their visitors through experiences like the EYES program (Weil, 2002).

The EYES program has the potential to offer visitors a “transformative experience”, as termed by Soren (2009), by providing visitors with an opportunity to participate in hands-on experiences with nature that can generate emotional connections with the natural environment. Over the course of this formative evaluation, I observed that participants found the trial program enjoyable. The survey results also indicated that the respondents believed that this is a beneficial program and an attractive learning experience. Similar to other free-choice learning experiences, the new nature observation program was designed to allow visitors to explore and connect with
the material in their own way. Through this facilitated experience, visitors can cultivate curiosity about nature and be encouraged to investigate their local surroundings independently.

Following Bitgood’s (1994) recommendation, EYES program’s impact will be continually assessed, assisted by the visitors’ shared nature observations. The ongoing improvements will aid the EYES program’s development into an effective and valued long-term program. One recommendation for a future study would be to examine the impact the EYES program has on visitors’ participation in outdoor nature activities and their interest in making nature observations. In addition, the study could determine if increased visitation has an effect on visitors’ participation in outdoor nature activities. To continually assess their impact, other Museum programs could integrate a method of receiving visitor feedback similar to the EYES program.

The EYES program can change with the seasons and incorporate a wide-range of natural history topics. As the program grows, it could introduce visitors to other nature-related resources and observation programs, such as NatureWatch. Additionally, the EYES program could promote membership in naturalist organizations, such as the Young Naturalist Club. In the future, the public’s increased interest in this nature observation program might encourage the Museum to revive the Thousand Eyes Project or investigate investing in a type of Nature Exchange. The EYES program can evolve over time as a long-term program, building relationships with visitors and potentially having an impact on their behaviour (Weil, 2002). The onsite, online and offsite nature of the program allows it to go beyond the Museum’s physical space, expanding the reach and the potential impact of this program and the Museum.
Summary of Recommendations

The formative evaluation indicated that museum visitors would be interested in participating in a nature observation program like EYES. To aid in its further development, the following are recommendations for the program, and the programming space, the Nature Lab.

**EYES Public Program.**

- The audience for the EYES program is predominately families with young children and so the program should be designed to primarily satisfy the needs of explorers and facilitators, two of the personal motivations, characterized by Falk, outlined in the Interpretative Master Plan (Nova Scotia Museum, 2009). However, in the future, the Museum could examine the possibly of encouraging participation from a broader demographic: teenagers, young adults, and seniors.

- For the EYES program to be successful, the formative evaluation found that facilitation was required. Therefore, at least one staff member or volunteer must be scheduled to facilitate the program.

- For scheduling, a two hour period on weekend afternoons worked well for the program. Therefore, for the best use of staff resources, I would advise not scheduling the program on Wednesday evenings.

- During the EYES program, visitors were invited to share their nature experiences and observations with the Museum during a return visit or through social media. Although, no observations were shared during the trial, the online survey indicated that visitors are interested in sharing their experiences and a few of the respondents even indicated that they would like more interactions through social media. To promote the EYES program and encourage the sharing of nature observations, I
propose using the Museum’s Facebook page and request specific observations (e.g. spring peepers mating call). In addition, the post-visit activity sheet could be available online. The EYES online components could potentially play a larger role.

- Offsite field trips, such as nature walks suggested in the online survey, could promote the EYES program and help to connect the public to nature. Therefore, the Museum should investigate the possibility organizing offsite programs and should work towards having them in the future.

- To best engage visitors, more investigate/experience activities, where visitors used their senses in hands-on activities to discover nature, should be incorporated into the EYES program. These activities can be simple and utilize magnifying glasses and touch boxes which are intuitive. Furthermore, to avoid overwhelming the visitors, fewer activities or well defined activity stations would work better on the Nature Lab center counter.

- The popular live displays can attract visitors to the Nature Lab and potentially connect visitors to the natural environment. Not only should live animals be used the EYES program, but the Museum should provide information about each animal in the Nature Lab. This information could aid in interpretation and encourage visitors to share their nature observations by seeing the examples collected by other visitors.

**Nature Lab.**

- The Nature Lab offers an intimate environment for the EYES program where visitors can interact with staff, share their stories and ask questions. However, there are a few issues about the space that need to be addressed.
• The Nature Lab lacks “immediate apprehendability” and does not invite visitors into the space. Therefore, the space needs clear signage that identifies the Nature Lab and information about programming. Two identification signs should be placed outside the Nature Lab; one sign should be placed in front of the lab and the other sign, visible from the ramp to the galleries, should protrude from the wall. Additionally, Nature Lab hours and programming should be posted outside, as well as an “open/closed” sign.

• Information about the Nature Lab and its programs should be included on the Museum’s website, to allow visitors to include the Nature Lab and the EYES program in their plans for their visits.

• The office-like appearance of the Nature Lab needs to be changed to make the space more inviting to visitors and invoke their curiosity. In addition, the layout should be examined to improve the visitor’s continual flow and its use as a programming space.

• For the visitors’ comfort and for the health of the live animals, the Nature Lab’s ventilation should be renovated to improve the air quality and temperature of the space.
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Appendix A—EYES in Winter Program Outline

Exploring Your Extraordinary Surrounding (EYES) in Winter
Prototype of New Nature Observation Program

<table>
<thead>
<tr>
<th>Program Created:</th>
<th>Program Created by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature Lab program for Winter 2013 (January – February) as part of a formative program evaluation</td>
<td>Heather McKinnon Ramshaw</td>
</tr>
</tbody>
</table>

Program Description for Marketing Purposes:

Resist the urge to hibernate this winter! Come to the Museum’s Nature Lab to discover “cool” stuff you can find outside during this extraordinary time of the year. Be inspired to explore nature on your own. After, share your experiences with the Museum. We would love to hear about it!

Audience:

Visitors - all ages – Public; Facilitator and Explorer

<table>
<thead>
<tr>
<th>Suggested Group Size:</th>
<th>Facilitation:</th>
<th>Program Length:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Staff: 1</td>
<td>1 – 2 hours</td>
</tr>
<tr>
<td></td>
<td>Volunteers: 0</td>
<td></td>
</tr>
</tbody>
</table>

IMP Content Area:

A. Forming. A.5 Biodiversity - Life Forms and Ecosystems, Species Diversity, and Ecosystem Diversity

Theme:

Visitors will learn about nature in winter and be encouraged to make their own nature observations.

Objectives:

1. Visitors will learn about natural history through hands-on experiences with specimens.
2. Visitors will be encouraged to make their own nature observations and collections.
3. Visitors will be provided with opportunities to share their findings and experiences with the Museum of Natural History during a return visit and/or through social media.

Outcomes:

1. To foster an appreciation and understanding of natural history.
2. To encourage visitors to observe, think, and reflect.
3. To stimulate the visitors’ curiosity about their natural surroundings.

### PROGRAM SUMMARY

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspiration</td>
<td>5 – 15 min</td>
<td>Visitors will be invited to explore one of the following nature topics:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Birds in Winter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Trees in Winter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Animal Signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open program - 3 to 4 self-guided activities / facilitated activities that may be completed individually and in any order:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. <em>Explore</em>: visitors will explore and learn about a nature-related topic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. <em>Observe</em>: visitor will examine specimens and be encouraged to observe a natural phenomenon first-hand on their own,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. <em>Investigate/experience</em>: visitors will investigate or experience nature by participating in a hands-on activity and be encourage to make their own discoveries at home.</td>
</tr>
<tr>
<td>Action</td>
<td>15 – 60 min</td>
<td>Visitors will be encouraged to take the following post-visit sheets home to help them make their own nature observations:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Information about the EYES in Winter program and options to share their nature observations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Winter Nature Bingo with information about the EYES in Winter program and options to share their nature observations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All sheets will have contact information for visitors to share their observations with the Museum – including mailing address, email, twitter information, and Facebook.</td>
</tr>
<tr>
<td>Share</td>
<td>5 – 15 min</td>
<td>Visitors will be invited to share their own nature observations and experience with the Museum by any of the following ways: in person, mail, email, Twitter or Facebook.</td>
</tr>
</tbody>
</table>

### Inspiration - Program Topics & Activity Descriptions

#### Birds in Winter

**Materials**

| Specimens, artifacts, props, etc.: | Origin or Location: |
### EXPLORE: Loves, Hates and Tolerates

<table>
<thead>
<tr>
<th>Activity</th>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
</table>
| Loves, Hates or Tolerates | • Bird Specimens  
   • Lover, Hater & Tolerater Cards  
   • Bird Identification Cards | 1. Place the three bird specimens on Lab table.  
2. Place cards in piles in front of the three birds. |

### OBSERVE: Bird Nests

<table>
<thead>
<tr>
<th>Activity</th>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
</table>
| Looking for Bird Nests | • Bird Nests | 1. Place bird nest on Lab table.  
2. Place Bird Identification cards in a pile next to the nests. |

### INVESTIGATE/EXPERIENCE: Birdfeeder

<table>
<thead>
<tr>
<th>Activity</th>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
</table>
| Build a Birdfeeder | • Birdfeeder example  
   • Birdfeeder Instructions (Post-visit activity sheet) | 1. Place Birdfeeder examples and instructions on the Lab table. |

### Set-up

1. Bird Specimens and nests are to be stored in the downstairs office.  
2. All other props are to be place in the program box.

### EXPLORE: Loves, Hates or Tolerates

**Procedure:**

1. Visitors are introduced to the terms, chionophile (winter-lover), chionophobe (winter-fearer), and chionophore (winter-tolerater).  
2. Visitors are asked to choose the term that they think best describes the 3 bird specimens.
### OBSERVE: Looking for Bird Nests

**Procedure:**
1. Visitors will examine different bird nests and be asked to match the bird species that may have built it.
2. Visitors will be asked to try to look for bird nests in their local natural areas.

**Conversation Points:**
- Look for differences and similarities in the bird nests.
- What material did it use?
- What materials do you think would make a good bird nest?
- How big are the eggs? What color are the eggs?

**Suggestions for modifications:**
- How big is the bird that made this nest?
- In the Bird gallery there is a display of bird eggs. Try to find the eggs that would go in this nest.

**Safety considerations:**
- Two finger touch only on the owl specimen
- Visitors cannot handle the nests.
### INVESTIGATE/EXPERIENCE: Build a Birdfeeder

| Procedure: | 1. Visitors will be shown two samples of simple birdfeeders that they can make a home. – Milk Carton Birdfeeder  
2. Instructions will be provided to visitors  
3. Visitors will be encouraged to share the different species of birds that come to their birdfeeder through Museum’s social media sites. |
| Conversation Points: | • Do have a birdfeeder?  
• What kind of birds have you seen in your backyard? |
| Suggestions for modifications: | • None |
| Safety considerations: | • Birdfeeder should be made under the supervision of adults. |

### Instruction Sheets

<table>
<thead>
<tr>
<th>Questions</th>
<th>Clues or Fun Facts</th>
<th>EYES Adventure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLORE: Loves, Hates, or Tolerates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity #1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Chionophile? Chionophobe? Chionophore? Which one best describes each of these birds? | What do these birds like to eat?  
Do they fly South for the Winter? | |
| **OBSERVE: Looking for Bird Nests** | | |
| Activity #2 | | |
| **Looking for Bird Nests** | | |
| Look at these Birds’ Nests. What is different and what is the same? What are they made of? | Winter is a great time to spot birds’ nests in the trees.  
Why not try to look for nests? After, share what you found with the Museum. See the EYES Information Sheet for more details. | |
| **INVESTIGATE/EXPERIENCE: Build a Birdfeeder** | | |
| Activity #3 | | |
| **Build a Birdfeeder** | | |
| Birdfeeders are a good way to discover backyard birds. | You can make this milk carton birdfeeder at home. Tell us about your birdfeeder and the different birds that enjoyed it. | |
Loves, Hates & Tolerates Cards

Winter-Lover

Winter-Fearer

Winter-Tolerater

Winter-Tolerater
**Bird Identification Cards**

**BARRED OWL**

**STATUS:**
Our most common owl

**RANGE:**
Across Canada and south to Florida and the Gulf Coast and Mexico.

**HABITAT:**
Old Growth Forests. Nests in the hollow of hardwood trees.

**FAVORITE FOOD:**
Meadow Voles, Mice & Shrews

**CALL:**
*Who-cooks for you?*

---

**Hairy Woodpecker**

**STATUS:**
One of our most common woodpecker

**RANGE:**
Southern Alaska to Newfoundland and south to Panama.

**HABITAT:**
Wooded Areas. Nests in holes in trees which it makes.

**FAVORITE FOOD:**
Insects

**CALL:**
Short sharp *Peek*

---

**American Robin**

**STATUS:**
Common

**RANGE:**
Across Canada and south to Northern Mexico

**HABITAT:**
Forests, farmland, and cites.

**FAVORITE FOOD:**
Earthworms, Beetle Grubs, Caterpillars and Berries

**CALL:**
*PEEK!! tut tut tut tut... then seeech each-each-each.*

---

**Cedar Waxwing**

**STATUS:**
Common

**RANGE:**
Across Canada and south to Southern United States.

**HABITAT:**
Woodlands, old fields, grassland and desert washes

**FAVORITE FOOD:**
Berries and Insects

**CALL:**
A high-pitched, trilled *bzeee* and a sighing whistle, about a half-second long, often rising in pitch at the beginning.
### Trees in Winter

#### Materials

<table>
<thead>
<tr>
<th>Specimens, artifacts, props, etc.</th>
<th>Origin or Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLORE 1: Not All Cones Are Pine Cones</td>
<td></td>
</tr>
<tr>
<td>Conifer Tree Specimens</td>
<td>Interpretation Collection</td>
</tr>
<tr>
<td>Cones – Pine &amp; Spruce</td>
<td>Interpretation Collection</td>
</tr>
<tr>
<td>Tree Species Labels</td>
<td>Created</td>
</tr>
<tr>
<td>Containers</td>
<td>Nature Lab</td>
</tr>
<tr>
<td>EXPLORE 2: Tree Rings</td>
<td></td>
</tr>
<tr>
<td>Tree Cookies – hardwood &amp; softwood</td>
<td>Interpretation Collection</td>
</tr>
<tr>
<td>Magnifying Glasses</td>
<td>Nature Lab</td>
</tr>
<tr>
<td>OBSERVE: Hidden Leaves</td>
<td></td>
</tr>
<tr>
<td>Twig Specimens</td>
<td>Interpretation Collection</td>
</tr>
<tr>
<td>Magnifying Glasses</td>
<td>Interpretation Collection</td>
</tr>
<tr>
<td>Tree Species Identification Sheet</td>
<td>Created</td>
</tr>
<tr>
<td>INVESTIGATE/EXPERIENCE: Evergreen Challenge</td>
<td></td>
</tr>
<tr>
<td>Conifer Tree Needles – Pine, Spruce, &amp; Fir</td>
<td>Collected</td>
</tr>
<tr>
<td>Scent bottles</td>
<td>Interpretation Prop Inventory</td>
</tr>
<tr>
<td>Conifer Tree Specimens</td>
<td>Collected</td>
</tr>
<tr>
<td>“Evergreen Challenge” Tally Sheet</td>
<td>Created</td>
</tr>
<tr>
<td>Clipboard &amp; Pencil</td>
<td>Office Supplies</td>
</tr>
</tbody>
</table>

#### Set-up

<table>
<thead>
<tr>
<th>Activity</th>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLORE 1</td>
<td>Conifer specimens</td>
<td>1. Place all cones in cone containers with tree labels.</td>
</tr>
<tr>
<td>Not All Cones Are Pine Cones</td>
<td>Cones</td>
<td>2. Place conifer tree specimen beside cone containers.</td>
</tr>
<tr>
<td></td>
<td>Containers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tree Labels</td>
<td></td>
</tr>
<tr>
<td>EXPLORE 2</td>
<td>Tree Cookies</td>
<td>1. Place tree cookies on the lab center counter and the magnifying glasses beside them.</td>
</tr>
<tr>
<td>Tree Rings</td>
<td>Magnifying Glasses</td>
<td></td>
</tr>
<tr>
<td>OBSERVE</td>
<td>Twig Specimens</td>
<td>1. Place tree species cards and twig specimens on lab table.</td>
</tr>
<tr>
<td>Hidden Leaves</td>
<td>Tree Species Cards</td>
<td></td>
</tr>
</tbody>
</table>
### Activity: Investigate/Experience

**Evergreen Challenge**

<table>
<thead>
<tr>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer needles</td>
<td>1. Conifer needle should be placed inside scent bottles.</td>
</tr>
<tr>
<td>Scent bottles</td>
<td>2. Place scent bottle on the lab table.</td>
</tr>
<tr>
<td>Tally Sheet</td>
<td>3. Place the “Evergreen Challenge” tally sheet with the clipboard beside the scent bottles.</td>
</tr>
<tr>
<td>Chipboard &amp; pencil</td>
<td></td>
</tr>
</tbody>
</table>

### Clean-up After the Program

- All props are returned to the program box.

### Explore 1: Not All Cones Are Pine Cones

| Procedure:  | 1. Visitors are asked to examine the two different cones and notice the differences and the similarities.  
             | 2. Visitors are encouraged to look for cones and think about the different tree that produced them.        |
| Conversation Points: | Do you notice that the cones are different shapes? 
                                 | Have you ever seen these cones 
                                 | The cones are an important food source for wildlife |
| Suggestions for modifications | Younger visitors are asked to observe the different shapes of the tree specimens and the cones. |
| Safety considerations: | None |

### Explore 2: Tree Rings

| Procedure:  | 1. Visitors are asked to count the tree rings to determine the age of the tree |
| Conversation | Why are some rings wider than the others? |
**OBSERVE: Hidden Leaves**

<table>
<thead>
<tr>
<th>Points:</th>
<th>Suggestions for modifications</th>
<th>Safety considerations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Do you notice a difference between the hardwood and the softwood?</td>
<td>• None</td>
<td>• Some visitors may be allergic to conifer needles.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure:</th>
<th>Conversation Points:</th>
<th>Suggestions for modifications:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Visitors are asked to match 3 twig samples with tree species.</td>
<td>• Did you ever think about how the tree produces leaves?</td>
<td>• Look for differences and similarities in the twigs.</td>
</tr>
<tr>
<td>2. Discuss the parts of a twig and leaf production</td>
<td>• Why do leaves fall off the trees in the autumn?</td>
<td>• Twigs are fragile. Visitors are asked to handle the twigs gently.</td>
</tr>
<tr>
<td>3. Visitors will be encouraged to look for different deciduous trees in winter.</td>
<td>• Why do the leaves change color in the autumn?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Why do trees have leaves?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety considerations:</th>
<th>Suggestions for modifications:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Twigs are fragile. Visitors are asked to handle the twigs gently.</td>
<td>• Look for differences and similarities in the twigs.</td>
</tr>
</tbody>
</table>
### INVESTIGATE/EXPERIENCE:
The Evergreen Challenge (Conifer Blind Smell Test)

| Procedure:                                                                 | 1. Visitors are asked to smell 3 different trees in the smell bottles.  
|                                                                           | 2. Visitors are asked to choose which conifer tree they think smells the  
|                                                                           |   best.                                                                   
|                                                                           | 3. Visitors are asked to mark their choice on the tally sheet.           
|                                                                           | 4. After the visitor chooses their favorite smell, the facilitator will reveal  
|                                                                           |   the identity of the conifer trees.                                   
|                                                                           | 5. Visitors are encouraged to find their favorite winter smells and share  
|                                                                           |   their new favorite nature smell with the Museum.                        

| Conversation Points:             | • Did you ever stop and smell the trees?  
|                                 | • What is your favorite winter smell?     

| Suggestions for modifications:   | • None                                    

| Safety considerations:           | • Some visitors may be allergic to conifer needles.  

**Instruction Sheets**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Clues or Fun Facts</th>
<th>EYES Adventure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLORE 1 – Not All Cones Are Pine Cones</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity #1</strong></td>
<td>Not all cones are Pine cones! How are the Spruce cones different from the Pine cones? <em>Use a Magnifying Glass to get a closer look.</em></td>
<td>did you know? There are female and male cones. Male cones have pollen and female cones have seeds. These cones are female cones.</td>
</tr>
<tr>
<td><strong>EXPLORE 2 – Tree Rings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity #4</strong></td>
<td>How old were these trees? <em>Count the Rings</em></td>
<td>did you know? Trees rings are wider when growing conditions were good and narrower when times were hard. A Dendroclimatologist can learn about past climates looking at tree rings.</td>
</tr>
<tr>
<td><strong>OBSERVE – Hidden Leaves</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity #2</strong></td>
<td>Look at these twigs and examine the buds. Using the Winter Tree ID, can you tell what kind of tree they are from?</td>
<td>did you know? Trees “hide” their leaves in the buds until they are ready to come out in the Spring. Why not try to look for different tree buds? After, share what you found with the Museum. See the EYES Information Sheet for more details.</td>
</tr>
<tr>
<td><strong>INVESTIGATE/EXPERIENCE – Conifer Blind Smell Test (The Evergreen Challenge)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity #3</strong></td>
<td>Take the Evergreen Challenge! Which conifer tree smells better to you? A, B, or C?</td>
<td>Next time you are outside, try to find your favorite winter smell. Tell us about your favorite winter smell. See the EYES Information Sheet for more details.</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Animal Signs

#### Materials

<table>
<thead>
<tr>
<th>Specimens, artifacts, props, etc.</th>
<th>Origin or Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INVESTIGATE/EXPERIENCE: Mystery Animals</strong></td>
<td></td>
</tr>
<tr>
<td>Touch Boxes</td>
<td>Interpretation Prop Inventory</td>
</tr>
<tr>
<td>“Mystery” Boxes (Dissecting trays and covers)</td>
<td>Nature Lab</td>
</tr>
</tbody>
</table>

**Animal #1: Coyote**

- Coyote Track: Created – Animal Signatures book
- Coyote Pelt: Interpretation Collection
- Coyote Scat: Interpretation Collection

**Animal #2: Deer**

- Deer Track: Created – Animal Signatures book
- Deer Browse: Interpretation Collection
- Deer Antler: Interpretation Collection

**Animal #3: Hare**

- Hare Scat: Interpretation Collection
- Hare browse: Interpretation Collection
- Hare Fur: Interpretation Collection

**EXPLORE 1: Browse**

- Beaver Browse: Interpretation Collection
- Mammal Jaws Set: Interpretation Collection

**EXPLORE 2: Scat**

- Deer Scat—Summer & Winter: Interpretation Collection

**OBSERVE: Tracks**

- Animal Tracks by Numbers: Created
### Set-up

<table>
<thead>
<tr>
<th>Activity</th>
<th>Materials</th>
<th>Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INVESTIGATE/EXPERIENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mystery Animals</td>
<td>• See above Materials list</td>
<td>1. Each of the animal specimens are placed in a mystery box.</td>
</tr>
<tr>
<td></td>
<td>• Garbage Bag</td>
<td>Coyote:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mystery Box – Scat &amp; Track</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clue – Pelt in Garbage Bag</td>
</tr>
<tr>
<td><strong>Stations:</strong></td>
<td></td>
<td>Deer:</td>
</tr>
<tr>
<td>1. Hare</td>
<td></td>
<td>• Mystery Box – Browse &amp; Track</td>
</tr>
<tr>
<td>2. Deer</td>
<td></td>
<td>• Clue – Antler in Touch Box</td>
</tr>
<tr>
<td>3. Coyote</td>
<td></td>
<td>Hare:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mystery Box – Browse &amp; Scat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clue – Fur in Touch Box</td>
</tr>
<tr>
<td><strong>EXPLORE 1 Browse</strong></td>
<td>• Beaver Browse</td>
<td>1. Place browse and jaws next to Question Sheet.</td>
</tr>
<tr>
<td></td>
<td>• Mammal Jaw Set</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLORE 2 Scat</strong></td>
<td></td>
<td>1. Place scat next to Question Sheet.</td>
</tr>
<tr>
<td></td>
<td>• Deer Scat – Summer &amp; Winter</td>
<td></td>
</tr>
<tr>
<td><strong>OBSERVE Tracks</strong></td>
<td>• Question Sheet</td>
<td>No props to set up.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clean-up After the Program</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Animal specimen can remain in the mystery and touch boxes after the program.</td>
<td></td>
</tr>
</tbody>
</table>

**INVESTIGATE/EXPERIENCE: Mystery Animals**

**Procedure:**
1. Using the specimen clues at the three stations, visitors are asked to identify the three animals that are active in the winter.
2. Visitors will examine the browse, scat and tracks of each animal.
3. For the final clue, visitors can put their hand in the touch box or bag.
4. Facilitator will tell the visitor if their guess is correct.
5. Visitors will be encouraged to share any animal signs they discover on their own.

**Conversation Points:**
- Have you ever seen any animal tracks?
- Do you know what is browse?
- Scat can tell us a lot about an animal including what it eats and where it lives.

**Suggestions for modifications**
- For younger children, they can try to guess the animal using the touch box or just ask them how it feels.

**Safety considerations:**
- None

---

### EXPLORE 1: Browse

**Procedure:**
1. Visitors are asked to look at the browse specimen and the various animal jaws
2. Visitor tries to guess which animal made the browse.

**Conversation Points:**
- Which of these animals are herbivores?
- Have you ever seen this kind of browse?

**Suggestions for modifications**
- None

**Safety considerations:**
- None

---

### EXPLORE 2: Scat

**Procedure:**
1. Visitor asked to look at the two types of deer scat (winter and summer.
2. Visitor tries to figure out why the two are different

**Conversation Points:**
- Do you know what deer eat?
- What is outside in the summer that is not around in the winter?
- What do deer eat in the winter?
**Instruction Sheet**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Clues or Fun Facts</th>
<th>EYES Adventure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity #1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Look at the signs inside the Mystery Animal boxes.</td>
<td></td>
<td>Most of the time we never see animals, but if we look we can find the signs they leave behind, like scat, browse, or tracks. Look for animal signs next time you are out exploring. Share your discoveries with the Museum. See the EYES Activity Sheet for more details.</td>
</tr>
<tr>
<td>Try to guess the animal that would leave behind those signs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**OBSERVE - Tracks**

<table>
<thead>
<tr>
<th>Procedure:</th>
<th>1. Visitor can learn about an easy way to identify tracks by counting the toes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation Points:</td>
<td>● What is different about the tracks? &lt;br&gt;● What is missing on the bobcat track that you could see on the coyote track?</td>
</tr>
<tr>
<td>Suggestions for modifications:</td>
<td>● None</td>
</tr>
<tr>
<td>Safety considerations:</td>
<td>● None</td>
</tr>
<tr>
<td>Questions</td>
<td>Clues or Fun Facts</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>EXPLORE 1 – Browse</strong></td>
<td></td>
</tr>
<tr>
<td>Activity #2</td>
<td>To identify browse, you have to think about what animal would eat this plant and how do they use their teeth, tongue and mouth to eat it.</td>
</tr>
<tr>
<td></td>
<td>Look at these jaws and the browse. Which animal is the browse from?</td>
</tr>
<tr>
<td><strong>EXPLORE 2 - Scat</strong></td>
<td></td>
</tr>
<tr>
<td>Activity #3</td>
<td>Scat can tell us about an animal’s diet and health. An animal’s scat can change with the seasons.</td>
</tr>
<tr>
<td></td>
<td>Look at the summer and winter deer scat. Why do you think they are different?</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OBSERVE: Tracks</strong></td>
<td></td>
</tr>
<tr>
<td>Activity #4</td>
<td>Animal tracks can be seen easily in the snow. An easy way to identify tracks is to count the toes.</td>
</tr>
</tbody>
</table>
Appendix B—Handout with Instructions to Share Observations

EXPLORING YOUR EXTRAORDINARY SURROUNDINGS IN WINTER

Share Your Winter Experiences With Us!

The Museum of Natural History would love to hear about your experience exploring your extraordinary surroundings! Take a photo, draw a picture, or just simply tell us about a “cool” thing you discovered. We will share your nature sightings with museum visitors.* To send your nature observations to us, you can:

- **Tweet it** - Museum of Natural History’s Twitter page with #NatLab
- **Post it** - Museum of Natural History’s Facebook page at http://www.facebook.com/MuseumofNaturalHistory and include “EYES” in your post.
- **Email it** - Heather at xxxxxx and include “EYES” in the subject line.
- **Mail it** - Museum of Natural History – Nature Lab xxxxxx
- **Give it** to us on your next visit to the Museum! Talk to a Naturalist.

*Your nature observations will be included in a video display in the Nature Lab. We will only include the animal or plant name and/or location you provide. Any personal information (e.g. name or email address) will not be disclosed. Any hardcopies of pictures or drawings cannot be returned.
## Winter Nature BINGO

Using your senses (sight, hearing, smell, touch, and taste) try to find these things. Mark an “X” in the square if you find it.

<table>
<thead>
<tr>
<th>B</th>
<th>I</th>
<th>N</th>
<th>G</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evergreen Tree</td>
<td>Feather</td>
<td>Squirrel Tracks</td>
<td>Bird Nest</td>
<td>Fir Needles</td>
</tr>
<tr>
<td>Wind</td>
<td>Rough Bark</td>
<td>Bracket Fungus</td>
<td>Deer Browse</td>
<td>Smooth Rock</td>
</tr>
<tr>
<td>Crunching Snow</td>
<td>Buds on a Tree</td>
<td>Make a Snow Angel</td>
<td>Bird Call</td>
<td>Pine Cone</td>
</tr>
<tr>
<td>Spruce Cone</td>
<td>Bird Tracks</td>
<td>Snow</td>
<td>Something Wet</td>
<td>Something the Same Color as Your Mittens</td>
</tr>
<tr>
<td>Tree that Lost All Its Leaves</td>
<td>Tree Your Height</td>
<td>Dry Leaves</td>
<td>Somebody’s Home</td>
<td>Bird</td>
</tr>
</tbody>
</table>

*EYES IN WINTER – Nova Scotia Museum of Natural History 2013*
EXPLORE YOUR EXTRAORDINARY SURROUNDINGS
IN WINTER

Share Your Winter Experiences With Us!
The Museum of Natural History would love to hear about your experience exploring your extraordinary surroundings! Take a photo, draw a picture, or just simply tell us about a cool thing you discovered. Your observations shared with museum visitors by a video display outside the Nature Lab. To send your nature observations to us, you can:

- Tweet it - [Twitter page link]
- Post it - Museum of Natural History’s Facebook page at [Facebook page link] and include “EYES” in your post.
- Email it - [Email address]
- Mail it - Museum of Natural History - Nature Lab

*Please note - Pictures or drawings cannot be returned.
- Give it to us on your next visit to the Museum! Talk to a Naturalist.

Discover Backyard Birds - Make a Bird Feeder

Materials:
- Empty 2 L milk carton
- Scissors
- String or cord
- Hole punch or pencil
- Bird seed

1. Cut a hole in the bird feeder. It should be large enough so a bird could sit, but not too large or the carton may become unsteady.
2. Cut a hole using the hole punch in the top of the milk carton and put a string through the hole. You can also use a pencil to poke a hole on either side of the flap at the top of the carton. Then, you can tie a knot in the string.
3. Fill the carton with bird seed until it reaches the top of the hole.
4. Hang the your feeder a tree branch and wait for the birds to come!

Reference:

Where to Explore
Trails in HRM - [Halifax Trails link]
Information about the many different trails around the Halifax Regional Municipality, including maps and their potential for winter outdoor activities.

Nova Scotia Provincial Parks - [Parks link]
Many provincial parks are ideal for winter hiking, cross country skiing, and snowshoeing, so long as park visitors use caution as trails are not maintained during the winter and usual park services are not available.

Shubenacadie Wildlife Park - [Shubenacadie Wildlife Park link]
Shubenacadie Wildlife Park is open for visitors to experience a variety of wildlife. Winter visiting hours are 9 a.m. to 3 p.m. on weekends only.

Tips for Safe Winter Expedition
- Use caution around ponds, lakes, streams and rivers.
- Spring thaw.
- Avoid sunburns - wear a wide brimmed hat or toque, sunglasses and sunscreen with minimum SPF #15 or higher.
- Staying hydrated during winter activities. Keeping your water bottle inside a pocket, or in a backpack close to your back to prevent freezing. You can also carry a thermos with warm liquid, like herbal tea or apple cider.

For more safety tips check out - Take the Roof Off Winter - [Roof Off Winter link]
Appendix D—Online Survey

Museum of Natural History Public Program Online Survey

This survey was found on the Museum of Natural History website.

OVERVIEW

You are being asked to participate in a research survey project entitled “Beyond the Museum: Evaluation of a Public Program to Encourage Visitors’ Connection with Nature”, which is being conducted by Heather McKinnon Ramshaw, a student at Royal Roads University and staff member of the Nova Scotia Museum of Natural History, Halifax, Nova Scotia. This survey will be anonymous.

- No one, including the researcher, will be able to associate your responses with your identity and your participation is voluntary.
- You may choose not to take the survey, to stop responding at any time, or skip questions that you do not want to answer.
- You must be at least 18 years of age to participate in the survey.
- Your completion of the survey serves as your voluntary agreement to participate in the survey and your certification that you are 18 or older.

Information collected on the survey will only be used for this research survey project and will be managed in accordance with the Freedom of Information, Protection of Privacy Act of Nova Scotia. For questions regarding the purpose of this survey, please contact Heather McKinnon Ramshaw at [contact information]. For questions regarding privacy concerns, please contact Lauren Smith at [contact information]. Heather McKinnon Ramshaw’s credentials with Royal Roads University can be established by contacting Dr. Liza Ireland, Acting Program Head, MA in Environmental Education and Communication Program, at [contact information] or [contact information].

MUSEUM VISITATION

1. How many times have you visited the Museum of Natural History in the last 10 years? (Participant can only choose one answer.)
   - Never
   - Once
   - 2 – 3 times
   - 4 – 10 times
   - Over 10 times

2. How many times have you visited the Museum of Natural History since January 1, 2012? (Participant can only choose one answer.)
   - Never
   - Once
   - 2 – 5 times

   [Survey questions follow with radio button options for responses.]
3. When you visit the Museum of Natural History, who generally comes with you? You may check more than one answer. *(Participant can choose more than one answer.)*

- No one, I come on my own
- With family (which includes children under 12 years of age)
- With family (which does not include children under 12 years of age)
- With an organized group
- With friends

4. Please indicate how strongly you agree with the following statements. *(Participant can only choose one answer per row.)*

I like to visit the Museum of Natural History because…

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I am curious about natural history and like to discover new things.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>b. I like to share my interests with others and help them learn new things.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>c. I have an interest in specific natural history topics and I would like to learn more about them.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>d. I like to relax and reflect as I walk through the exhibits.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>e. I like to see new exhibits.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

5. Are you a Museum of Natural History (MNH) pass holder? *(Participant can only choose one answer.)*

- Yes, I am a current MNH pass holder.
- I have a Nova Scotia Museum pass (for all 27 sites).
- No, I don’t currently have a MNH pass, but I have had MNH pass previously.
- No, I don’t currently have a MNH pass and never had a pass before.
YOUR FAMILIARITY WITH THE MUSEUM OF NATURAL HISTORY

6. The Museum of Natural History opened the Nature Lab in 2010. In the Nature Lab, visitors can observe staff caring for the animals, see the various animals on display, and participate in public programs. Do you know where the Nature Lab is located in the Museum?

(Participant can only choose one answer.)

- Lower Level by Parking Lot Entrance
- Main Level by Netukulimk (Forest Exhibit)
- The Galleries (up the ramp)
- Foyer across from the Admissions Desk
- I don’t know

7. Did you know that you could participate in public programs in the Nature Lab?
   If no, please proceed to Question #10 on the next page.
   (Participant can only choose one answer.)

- Yes
- No
- I don’t know

8. Have you or your family ever participated in public program in the Nature Lab?
   (Participant can only choose one answer)

- Yes
- No
- I don’t know

9. Have you or your family participated in the new public program in the Nature Lab – *EYES in Winter* (January – March 2013)?
   (Participant can only choose one answer.)

- Yes
- No
- I don’t know

YOUR INTEREST IN OUTDOOR ACTIVITIES AND NATURAL HISTORY

10. How often do you participate in outdoor activities for at least 30 minutes?
    (Participant can only choose one answer)

- Never
- Daily
- 1 – 3 times per week
- 1 – 3 times month
- 1 – 3 times per year
11. Please list three outdoor activities that you participate in most frequently.

1. 
2. 
3. 

12. Which season(s) do you usually participate in outdoor activities?  
(Participant can choose more than one answer.)

- Summer  
- Autumn  
- Winter  
- Spring

13. Please indicate how strongly you agree with the following statements.  
(Participant can only choose one answer per row.)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>f. I would like to have more opportunities that would encourage me to spent time outdoors.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>g. Due to an increase in population in cities, people have lost their connection with nature.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>h. I believe it is important to have a connection with nature.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>i. By connecting with nature, I can improve my mental and physical health.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>j. I think it is important for the Museum of Natural History to foster an appreciation of nature.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>k. By attending a Museum program, I believe the Museum of Natural History could help me connect with nature.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
14. Which of the following natural history topics would you be interested in learning more about? You may check more than one answer. *(Participant can choose more than one answer.)*

- [ ] Animal Signs
- [ ] Birds
- [ ] Weather Events
- [ ] Rocks
- [ ] Fossils
- [ ] Plants
- [ ] Marine Life
- [ ] Astronomy
- [ ] Mammals
- [ ] Fish
- [ ] Mushrooms
- [ ] Insects
- [ ] Other – Please list any other natural history topics that you are interested in learning more about.

**HOW DO YOU LIKE TO SHARE IDEAS?**

15. Please indicate how strongly you agree with the following statements. *(Participant can only choose one answer per row.)*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I like to communicate ideas through face to face interaction.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>b. I like to communicate ideas through social media (e.g. Facebook, Twitter, and Blogs).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>c. I am comfortable using social media to share ideas about natural history.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>d. I like to use internet sources to learn about natural history.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>e. Visiting an institution, like a museum, is the best way to learn about natural history.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
16. Please indicate how many times you use the following communication tools. *(Participant can only choose one answer per row.)*

<table>
<thead>
<tr>
<th>Communication Tool</th>
<th>Never</th>
<th>Daily</th>
<th>1 – 5 times per Week</th>
<th>1 – 5 times per Month</th>
<th>1 – 5 times per Year</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Mail letters via the Postal System</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b. Email</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>c. Texting</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d. Facebook</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>e. Twitter</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>f. Blogs</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

17. What other communication tools do you use?

---

**ABOUT YOU**

18. Where do you live?
   - ☐ Within the Halifax Regional Municipality (HRM)
   - ☐ Nova Scotia and outside the HRM
   - ☐ New Brunswick or Prince Edward Island
   - ☐ Canada and outside the Maritime Provinces
   - ☐ Outside Canada

19. What is your gender?
   - ☐ Male
   - ☐ Female

20. Please indicate which age group you belong to:
   - ☐ 18 – 24 years
   - ☐ 25 – 34 years
   - ☐ 35 – 54 years
   - ☐ 55 – 65 years
   - ☐ Over 65 years
21. If you have any additional comments related to this survey, they would be appreciated.

ENTER TO WIN THE SURVEY PRIZE!!

Thank you for taking the time to complete this online survey.

Your feedback will be valuable in the development of our new public program – EYES (Exploring Your Extraordinary Surroundings).

If you would like to be eligible for the survey prize, *The Gus Prize Pack*, please provide your name and contact information (telephone and/or email) in the space below. Your contact information will only be used for the draw.

The Gus Prize Pack includes:

- A private walk with Gus the Gopher Tortoise
- An annual MNH pass
- A Gus Youth T-shirt
- *Gus the Tortoise Takes a Walk* by Erin Arsenault

The draw for the prize will take place on March 7, 2013. One entry per person.

You can check out the EYES in Winter pilot public program on Saturday & Sundays – 1:00 p.m. – 3:00 p.m. and Wednesdays – 6:00 p.m. – 8:00 p.m. in the Nature Lab, until March 3, 2013.

To enter to win the Gus Prize Pack, please provide your contact information.

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Number:</td>
</tr>
<tr>
<td>Email Address:</td>
</tr>
</tbody>
</table>
# Prototype Public Program Observations – Formative Evaluation

## Program Details

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
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<tbody>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Topic:</th>
<th>Facilitator(s):</th>
</tr>
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<tbody>
<tr>
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</table>

## Visitor Participation

<table>
<thead>
<tr>
<th>Visitors - Entered Nature Lab</th>
<th>Total:</th>
<th>Visitors – Participated in Public Program</th>
<th>Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

## Visitor Details – Perceived Age

<table>
<thead>
<tr>
<th>Young Child (Age 0 – 5 years)</th>
<th>Child (Age 6 – 11 years)</th>
<th>Teenager (Age 12 – 17 years)</th>
<th>Young Adult (Age 18 – 24 years)</th>
<th>Adult (Age 25 – 64 years)</th>
<th>Senior (Age 65 + years)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Total:</th>
<th>Total:</th>
<th>Total:</th>
<th>Total:</th>
<th>Total:</th>
<th>Total:</th>
</tr>
</thead>
</table>

## Interest in Activities

<table>
<thead>
<tr>
<th>Activity #1:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Activity #2:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Activity # 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

## Visitor Comments

<p>| |</p>
<table>
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</table>

## General Observations (i.e. traffic flow, visitor interest, success of program)

<p>| |</p>
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<tbody>
<tr>
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</tbody>
</table>
GIVE US YOUR FEEDBACK & WIN THE GUS PRIZE PACK!

Take 5 to 10 minutes to complete an online survey that will help Museum of Natural History create a NEW public program and you can enter a draw to win the Gus Prize Pack!

THE GUS PRIZE PACK INCLUDES:
- A private walk with Gus the Gopher Tortoise
- An annual MNH pass
- A Gus youth T-shirt
- Gus the Tortoise Takes a Walk by Erin Arsenault

The draw for the survey prize will take place on March 7, 2013.

TO FILL OUT THE ONLINE SURVEY:
Go to the Museum of Natural History Website (museum.gov.ns.ca/mnh) and select About the Museum and then Survey.

THANK YOU FOR YOUR SUPPORT!

This online survey is part of a research project conducted by Heather McKinnon Ramshaw, Museum of Natural History Interpreter and a student at Royal Roads University. In addition to aiding in the development of this new public program, the research findings will be included in a final report that will be submitted to Royal Roads University in partial fulfillment of a Master of Arts in Environmental Education and Communication.

For questions regarding the purpose of the study, please contact Heather McKinnon Ramshaw at (902) 424-0440. For questions regarding privacy concerns, please contact Lauren Smith at (902) 424-6499. Heather McKinnon Ramshaw’s credentials with Royal Roads University can be established by contacting Dr. Liza Ireland, Acting Program Head, MA in Environmental Education and Communication Program, at (250)-896-4292 or Liza.ireland@royalroads.ca.
The Museum of Natural History is in the process of creating a new public program to encourage visitors to spend more time outdoors and foster an appreciation of the natural world. By voluntarily participating in this pilot public program in the Nature Lab, you can provide valuable feedback that will contribute to the development of this new nature observation program. During the program, visitors will be introduced to various nature-related topics and be encouraged to make their own observations that they can share with the Museum. Your participation, and any feedback that you are willing to provide, would be greatly appreciated.

This public program evaluation is part of a research project entitled *Beyond the Museum: Evaluation of a Public Program to Encourage Visitors’ Connections with Nature*. This project is being conducted by Heather McKinnon Ramshaw, a student at Royal Roads University and also an interpretation staff member at the Museum of Natural History. Throughout the program time, she will be recording observations, such as the number of visitors that participate in the program and the activities or topics that seem to interest them. Heather will also be noting any relevant comments made by visitors.

Observation records will be hand-written and summarized, in anonymous format, in the body of the final report. At no time will any specific observations or comments be attributed to any individual. The information collected will only be used for the purposes for which it was obtained and will be managed in accordance with the *Freedom of Information, Protection of Privacy Act* of Nova Scotia. In addition to aiding the development of this new public program, the research findings will be included in a final report that will be submitted to Royal Roads University in partial fulfillment of a Master of Arts in Environmental Education and Communication.

For questions regarding the purpose of the study, please contact Heather McKinnon Ramshaw at [contact information]. For questions regarding privacy concerns, please contact Lauren Smith at [contact information]. Heather McKinnon Ramshaw’s credentials with Royal Roads University can be established by contacting Dr. Liza Ireland, Acting Program Head, MA in Environmental Education and Communication Program, at [contact information] or [contact information].

You are not compelled to participate in this research project. If you do choose to participate, you are free to withdraw at any time without prejudice. Similarly, if you choose not to participate in this research project, this information will also be maintained in confidence.

This document constitutes an agreement to participate in this research project. By signing this letter, you give free and informed consent to participate in this project.

<table>
<thead>
<tr>
<th>Name (Please Print):</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature:</td>
<td></td>
</tr>
<tr>
<td>Signature of parent or guardian, if the participant is under 18 years of age:</td>
<td></td>
</tr>
<tr>
<td>Researcher’s Signature:</td>
<td></td>
</tr>
</tbody>
</table>