

Conservation or Exploitation?
Assessing the Education Impact of Accredited Zoological Institutions

by
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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Zoological institutions, and the animals that inhabit them, have fascinated people since their inception. Over time, the mandates of zoos and aquariums have evolved and diversified beyond their sole anthropocentric focus on human entertainment. Today, zoological institutions have mandates to safeguard the populations of endangered species, protect wild spaces, and promote environmental and conservation education. This study seeks to answer the following questions: How are zoological institutions attempting to contribute to conservation through environmental education? Are they successful?

Zoos and aquariums are in a unique position to play a role in fostering conservation and delivering experiential education opportunities to its visitors. Environmental education opportunities in zoological institutions raise awareness amongst the visiting public the ecological value of biodiversity, and the reintroduction of endangered species populations into the wild. Zoos achieve this through captive breeding programs and by collaborating on conservation programs with multiple stakeholders, including those who participate in citizen science projects.

This thesis explores the effectiveness of the educational programs of zoological institutions and in communicating a conservation message. In addition, the concept of learning through experiential and deep learning is investigated to evaluate the potential for positive behavioural changes towards environmental stewardship.

This study takes a qualitative multiple case study approach of three accredited zoological institutions – the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium – to determine the effectiveness of their current conservation education messages. A social media analysis of the zoos' Facebook pages and semi-structured interviews have been conducted with zoo volunteers to see if there is evidence of learning that might lead to stewardship and conservation behaviours in the zoos visitors. Additional insights into the impact that these educational efforts might have on conservation are provided through expert interview, personal observation, secondary literature, and grey literature. Findings suggest that experiential education programs are generating some conservation behaviours by members of the visiting public, particularly those who ultimately became volunteers at the zoos. The research also indicates that zoos could quite easily make more effective use of those volunteers and social media to more meaningfully communicate their environmental education programs, thereby enhancing and reinforcing the impact of their conservation work.

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1.0 A Critical Review of Zoos and Environmental Education: Introducing the Research Project

Accredited zoological institutions¹ have evolved in their mandates from ones that solely focused on human entertainment to places that endeavour to promote animal and habitat conservation through environmental education. This thesis investigates whether or not zoos are effectively delivering their mandate. It is important to investigate this issue because many species throughout the world are threatened and face mass extinction; their conservations requires concerted attention if they are to survive. This thesis specifically investigates the following questions: How are zoological institutions attempting to contribute to conservation through environmental education? Are they successful?

Considerable human, financial, and ecological resources are invested in large public zoological facilities with the assumption that they serve to fulfill the twin objectives of conservation and environmental education. This assumption merits close attention and assessment to see whether in fact they do play an important role in species and habitat conservation.

Biodiversity is under threat as a result of human impacts on the environment. Recent changes to the planet due to global climate change, along with pressure and demand on our natural resources, “is causing an unprecedented loss of habitats” (Hosey et al., 2013, p. 334). It is clear that the extinction rate of species is “very much greater than that which has happened throughout evolutionary time” (Hosey et al., 2013, p. 335). Now, more than ever, zoos are in a position to facilitate species conservation and enhance environmental education programs for the public.

¹ For the purposes of this thesis, zoological institutions (including aquariums) will be referred to as zoos.

In order to implement more effective public environmental education programs, it is first important to determine what pedagogical approaches could best serve to inform these programs. This thesis contributes academically to a growing body of environmental education literature with a specific focus on urban zoological facilities that claim to promote the protection of wildlife and habitat. In addition, this thesis considers whether accredited zoological institutions are adopting environmental education programs that effectively foster stewardship and conservation. Environmental education programs are offered by zoos to ensure the public can participate in wildlife conservation projects at these facilities and elsewhere after visitors have learned something about wildlife conservation. With conservation education being a key commitment of accredited zoos licensed under the Association of Zoos and Aquariums (AZA), “citizen knowledge and cooperation is of immeasurable value” to the success of these programs (Toronto Zoo, 2014). An examination of the efforts made by zoos aimed towards conservation rather than entertainment and the efforts made to implement such changes are considered within this thesis. The literature review will explore journals including *Biodiversity and Conservation*, *Journal of Environmental Education*, *Journal of Environmental Management*, and *Zoo Biology*.

The geographical boundaries of this study will center on three case study areas; they are the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium. The three accredited facilities are located within each of the provinces’ city centers. All three sites are roughly similar in proximity to major city centers and follow the same criteria for accredited zoos (see Appendix C). The participants of the case studies are zoo volunteers comprised of adult men and women 18 years and older. The insights of these volunteers are crucial in the framework of this thesis because they often offer environmental education for the visitors to their facility.

1.1 Research Framework

1.1.1 Environmental Education

The research framework of the thesis focuses on environmental education and zoological facilities as explored through the three case studies in order to address the research questions: How are zoological institutions attempting to contribute to conservation through environmental education? Are they successful? (see Figure 1.1 in Section 1.1.2). Environmental education comprises the first stage of the research framework because it is through public education that zoos will be able to disseminate their message and make tangible contributions towards stewardship and conservation. The purpose of environmental education in zoos is to bring awareness to the public about the role these institutions play in fostering appreciation of many diverse species and their ecological value, in engaging in extensive breeding programs created to reintroduce species into the wild, and in undertaking other conservation programs including partnerships with citizens and interest groups (Hutchins and Conway, 1995; Kusiak, 2012). To explore the role environmental education plays in zoos, the concept is examined through different pedagogical lenses drawing on the theoretical framework of Walter's "Philosophies of Adult Environmental Education" supplemented by other sources (Dewey, 2007; Kolb, 1984; Moore, 2010; Rogers, 1983). Various educational philosophies are investigated to determine the most appropriate approach for zoos. The case studies of the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium are analyzed to determine if these zoos are incorporating effective environmental education programs in order to foster conservation. These three case studies were chosen because each zoo is recognized as an accredited facility that meets the standards of Canada's Accredited Zoos and Aquariums (CAZA). CAZA ensures standards are met on all levels of safety/security, animal care, and veterinary care, with the insurance that conservation,

education and research are key elements in the zoo's mission statement (Canada's Accredited Zoos and Aquariums, 2012). These case studies were also chosen because they are geographically dispersed across Canada. Of the three zoos, Toronto Zoo is by far the largest in size, followed by the Calgary Zoo, and then the Vancouver Aquarium. All three are comparable in function and are situated within each of the provinces' largest metropolitan areas. Since all three facilities are similar, the same analysis is conducted for each, and the results are compared.

1.1.2 Animal Conservation Facilities

A comparative analysis of the zoos was conducted using three types of research methods: a secondary literature review (academic journals, zoo documents, and grey literature), a social media analysis of the zoos' Facebook pages, and through semi-structured interviews with volunteers who have donated their time to the zoos after being exposed to the educational programs offered. In addition, a semi-structured interview was also undertaken with a wildlife expert in order to provide insight into zoos' conservation values and to consider their experiential educational programs.

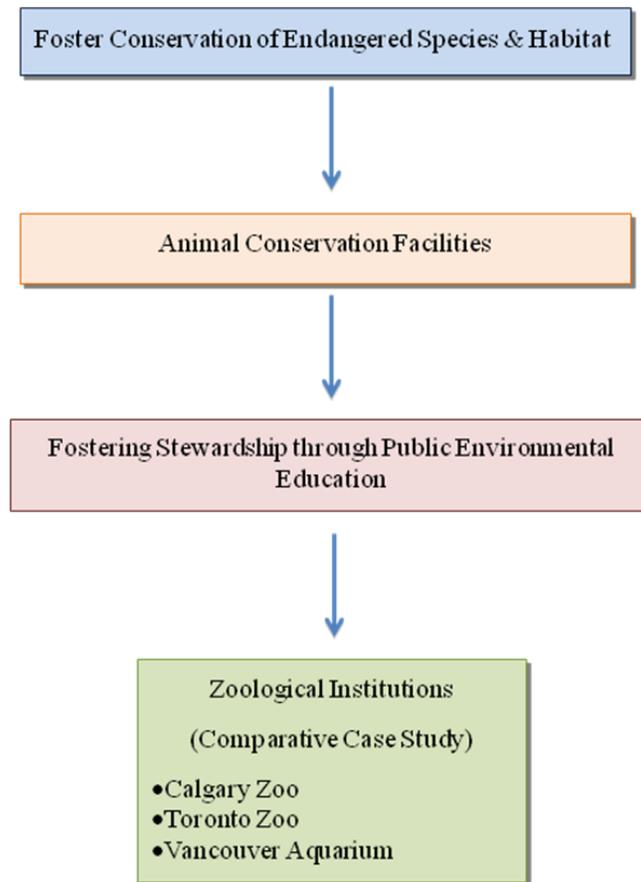


Figure 1.1: Research framework to be Used to Answer Proposed Research Question

1.2 Research Methodology

The following sections outline the research methodology used by the researcher to assess the research questions for this thesis.

a) Comparative case study analysis

This thesis combines aspects of a single case study and a multiple case study approach. The researcher goes into greater depth concerning the Toronto Zoo as compared to the other two case studies due to participant observations made over several years. This sets the Toronto Zoo apart from the other case studies as a larger focus for this thesis. In addition to the Toronto Zoo, the

two other zoos (Calgary Zoo and the Vancouver Aquarium) are explored to discern what might be common, or unique, amongst the three. This approach addresses one standard criticism of single case study analysis: that generalizations cannot be made from the findings of one case study (Bryman et al., 2012).

All three case studies share national culture, and all three meet CAZA criteria standards, which require certain resources of veterinary care and keeper care for the animals. The zoos are also similar in their orientation towards environmental education and stewardship programs, and share a similarity in their online presence. An open-ended approach is adopted to investigate “contextual insight[s] and a less structured research approach” (Bryman et al., 2012, p. 39).

b) Comparative literature review

In order to inform the research done for each of the three case studies, a comparative literature review of websites related to the three case studies, and peer-reviewed journals is conducted to explore environmental education in animal conservation facilities. An exploration of journals such as *Biodiversity and Conservation*, *Journal of Environmental Education*, *Journal of Environmental Management*, and *Zoo Biology* provided insight into various public education programs used to promote zoos’ conservation and environmental education mandates. The goal was to determine a) how zoological institutions are attempting to contribute to conservation through environmental education and b) if they are successful. The secondary literature was used to answer the research question to determine if any pre-existing literature can confirm the success of environmental education as a conservation method in zoos.

The literature review includes journals and monographs in conservation biology, zoology, and environmental education journals and animal conservation facility websites on

environmental education in non-traditional settings. The review includes information about stewardship, the importance of investigating endangered species and habitats, and public urban attitudes towards nature. The conservation relationships of all three case studies and their affiliations with various conservation organizations are examined to explore the zoos' outreach to, and impact in, the conservation community. Primary information research includes social media analysis, interviews with zoo volunteers, and participant observation.

c) Social media analysis

A comparative analysis was conducted for the three case studies using the official social media outlet Facebook to explore the potential for learning to occur at these facilities. A social media analysis was also conducted for the Assiniboine Park Zoo's Facebook page, and the findings are included in an appendix (see Appendix D). However, for this research project, evaluating Assiniboine Park Zoo did not prove to be of significant value. The Zoo did not allow access to their volunteers and therefore further consideration proved impossible. Further secondary research was explored to gain insights into the role that social media can play in promoting public education.

Qualitative comparative analysis through the social media site Facebook identified and categorized comments by examining initial postings to determine the attitudes of the public towards the Zoos. Both positive and negative feedback was documented with respect to potential learning opportunities through the visitor's experience. From this process, it was possible to ascertain an understanding of how the public views each animal conservation facility.

The social media analysis drew on Facebook postings between the time periods of May 1 to October 31, 2013. Following a methodology recommended by Altheide and Schneider, the

data was saved as a PDF to eliminate the potential for alterations in postings (Altheide & Schneider, 2013). The data was collected from the official Facebook pages of the case studies and the researcher categorized the information as a preliminary way to “review the data for emergent themes and narratives” (Altheide & Schneider, 2013, p. 109). The data consisted of comments from the Facebook pages of each zoo that showed examples of learning outcomes. For example, if a participant remarked on how certain initiatives undertaken by the facility contribute to the conservation of a species in question, that would be a form of learning. Conversely, if participants merely remarked on how excited they were to see said species, then there was no evidence of learning outcomes to extend beyond the participants visit. The goal was to see if an exploration of social media revealed any information about whether the educational programs offered evidence that they were successful in fostering stewardship. A pre-test was done using a sample week of comments from the Toronto Zoo’s Facebook page to get a sense of the nature of the comments and to ascertain the volume of comments and their related discussion threads.

d) Semi-structured interview of zoological institution volunteers

In addition to the social media data for each facility, qualitative data was collected using semi-structured interviews with volunteers at the Calgary Zoo, the Toronto Zoo, and Vancouver Aquarium. One of the objectives of this research was to explore whether the results of the primary research coincide with the results of the secondary literature. Identifying trends through categorized themes would help determine if patterns emerged in the course of the research. Data for the semi-structured interviews and comparative analysis of social media was processed using this method of coding.

Open-ended research questions gave the research participant an opportunity to offer insights that had not been presented nor elicited by the researcher (Bryman et al., 2012). The purpose of this approach was to bring out how interviewees personally interpret the questions and how they make sense of the issues and events. Interviewing a variety of volunteers revealed areas of consensus and divergence in perspectives with respect to the research question and, findings reveal some shared ideas around the role of zoos with respect to stewardship and conservation.

Open-ended interviews were arranged with volunteers from the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium. Volunteers at accredited facilities have the opportunity to educate the public about animals and the ongoing conservation initiatives that help to protect them. Interviews with zoo volunteers provide potential insight into whether time spent at these facilities promotes stewardship within the volunteers or if a pre-existing sense of stewardship preceded their placement at the zoological institution. This thesis examines how volunteers perceive their role and what they are contributing to these zoos, with respect to fostering conservation of endangered species and their habitat. Volunteer opportunities offered through AZA-accredited zoos include animal care, conservation education, conservation and research, and visitor services (Association of Zoos and Aquariums, 2007).

e) Participant observation

In addition to the social media and volunteer interview data, the researcher uses participant observations made at the Toronto Zoo, where the researcher is employed. This serves as the primary case study. The researcher's experience in environmental education is valuable because it provided insight into the behaviours of visitors and volunteers within the Zoo. Participant

observation provided context for the literature reviews, social media analysis, and semi-structured interviews. Qualitative methodology researchers, Bryman et al. assert that gaining insight through first-hand experience provides potential opportunities for understanding interactions as they are occurring but reduces the risk of subject reactivity (2012).

1.3 Framework of the Thesis

This thesis is organized into eight chapters. The first chapter began with the purpose, problem statement, applied and academic rationale, and methodology to provide the necessary background information for the study.

The second chapter is the literature review, which provides a brief background about the evolution of zoos. Pedagogical approaches to learning from the passive to the experiential are presented with an emphasis on environmental education, drawing on Pierre Walter's 2009 theoretical framework "Philosophies of Adult Environmental Education." In this chapter, examples are offered of ways that zoos are providing education and raising public awareness followed by a critical examination of zoos' ability to communicate a conservation message to the public.

Chapter Three continues the literature review with an exploration into what learning means and how effective and transformational learning approaches can foster positive behavioural changes in people. An evaluation into the different ways in which zoos are communicating a conservation message to the public follows along with a discussion of people's motivations to visit zoos and aquariums.

Chapter Four contains a discussion of the methodological approaches for the primary and secondary research of the thesis.

Chapter Five includes an introduction to each case study with an overview and description. A brief investigation is made into the practiced environmental education and conservation initiatives of the case studies.

Chapter Six includes a presentation of the results of the social media findings and the interviews from each zoological institution.

Chapter Seven contains the analysis of the primary and secondary research along with their implications of three zoological institutions as well as recommendations for strengthening the zoo's outreach and conservation education programs.

Finally, the thesis concludes with a response to the research question, along with the contributions of this thesis to the literature, and provides recommendations for future research.

2.0 From Entertainment to Education: A Literature Review of the Changing Mandates of Zoos

Throughout the world, people have long been fascinated with seeing live exotic animals. This is clear from the robust attendance and success of zoos around the world. These institutions have the potential to change people's attitudes towards and improve their knowledge of animals. This can, as a result, raise public concern and support for increasing animal welfare standards and promoting conservation. Furthermore, zoos are also places for recreation and entertainment, both of which can overshadow their mandate for environmental education and conservation.

Existing literature predominately centers on zoos *in situ* or on-site, and *ex situ* or off-site conservation actions involving captive breeding and management of wildlife populations. This chapter considers the attempts of modern zoos to transform themselves from traditional animal collections to conservation action centres. Efforts to change the mandate and appearance of zoos are explored in order to demonstrate to what extent zoos are focusing their resources towards conservation and environmental education initiatives. This discussion is followed by an examination of pedagogical changes in environmental education with a focus on zoos' efforts in education for conservation. Finally, the chapter closes with a review of critiques regarding the effectiveness of such conservation mandates.

2.1 From Menagerie of Marvels to Conservation Centre: The Evolution of Zoological Institutions

For the purposes of a literature review a clear understanding of what is meant by 'zoos' is required. The United Kingdom (UK) Government defines zoos as:

[A]n establishment where wild animals are kept for exhibition (other than a circus or a pet shop) to which members of the public have access, with or without charge for admission, on more than seven days in any period of twelve consecutive months. (Hosey et al., 2013, p. 4/ Zoo Licensing Act (Her Majesty's Stationery Office, 1981))

Circuses and pet shops are “covered by other legislation” and while this definition is motivated from a legal framework, it shares similar views as “other organizations within this field” (Hosey et al., 2013, p. 4). This paper and the case studies herein are concerned with accredited zoos. The definition of these institutions, both zoos and aquariums, are defined by professor of philosophy of science, Bryan G. Norton as: “a professionally managed zoological institution accredited by the American Zoo and Aquarium Association and having a collection of living animals used for conservation, scientific studies, public education, and public display” (2012). The Association of Zoos and Aquariums (AZA) also addresses the necessity within these facilities to maintain standards for animal welfare (Association of Zoos and Aquariums, 2014).

A step towards becoming a key player in the protection and conservation of wildlife and endangered species is to become a member of the Association of Zoos and Aquariums. In order to do this, a facility must receive accreditation, which is an “official recognition and approval of a zoo or aquarium by a group of experts, called the AZA Accreditation Commission” (Association of Zoos and Aquariums, 2014). The standards for such are very high. Many zoos “operate within a regulatory framework that includes both mandatory requirements (that is, those required by law) and procedures seen as reflecting good practice” (Hosey et al., 2013, p. 5). These guidelines can vary in different regions of the globe; however, to be accredited by the World Association of Zoos and Aquariums (WAZA), certain standards of animal care and welfare, environmental education and global conservation must be met (World Association of Zoos and Aquariums, 2014). Zoos have to comply with a wide range of “legislation and, in

particular, whether the regulation of [the zoo] is managed predominately nationally or locally” (Hosey et al., 2013, pp. 68-69). For example, in the United States of America (USA), “the main legislation within which [zoos] operate is the Animal Welfare Act of 1966” (Hosey et al., 2013, p. 73). Conversely, zoos in the UK are “regulated by the Zoo Licensing Act 1981 (ZLA), as amended, which incorporates into UK law the requirements of the 1999 EC Zoos Directive (Council Directive 1992/22/EC)” (Hosey et al., 2013, p. 73).

Acquiring public trust is a major benefit of becoming an accredited facility. Being a member of AZA assists a zoo by building public confidence in them because it indicates “an institution meets or exceeds current professional standards” (Association of Zoos and Aquariums, 2014). It also provides a publicly recognized badge suggesting excellence in, and commitment to, areas like animal care, conservation, and education, and distinguishes AZA-accredited zoos and aquariums from ‘roadside zoos’ (Association of Zoos and Aquariums, 2014). However, this last distinction is often still not understood by many people who do not appreciate the work behind many of these accredited facilities.

AZA accredited zoos and aquariums have opportunities for participation in Animal Exchange (access to specimens from other AZA-accredited facilities for loan or breeding) (Association of Zoo and Aquariums, 2014). As well, being a member of AZA allows for participation in the Species Survival Plan, AZA’s flagship Animal Conservation Program (Association of Zoos and Aquariums, 2014). The Species Survival Plan is the most vital program in helping to protect and increase endangered species’ populations through captive breeding, and further reintroduction of species to the wild.

Many animals are disappearing throughout the world at an alarming rate due to threats such as poaching, habitat loss, and overuse of natural resources (Corwin, 2009; Orenstein, 2013;

World Wildlife Fund, 2014). During the past decade, and for some time before that, accredited zoos have attempted to redefine themselves as organizations that play an integral role in the protection of endangered species. However, there is still some negative stigma attached to zoos and aquariums. The mandate of accredited zoos is to provide shelter and breeding sanctuaries for endangered animals. They also try to provide an understanding to the public about the importance of endangered species and the protection they need (Patrick & Tunnicliffe, 2013). If natural or human causes have made a species' habitat a threatening environment to live in, then human intervention can preserve that species where it would otherwise become extinct without any human involvement. Many would argue that there are certainly problems with trying to conserve endangered species by removing them from their natural habitat because this makes them entirely dependent on human intervention for their survival. However, there may be no other possibility for many of these species to survive on their own, because their natural habitat is no longer inhabitable. Zoos and aquariums are now beginning to recognize the benefits of being aligned with an accredited association, as mentioned previously. In order to generate a proper background on the topic at hand, a brief history of zoos is presented.

The phenomenon of collecting wild animals has long been established throughout history. When zoos and aquariums first emerged in the 19th century, they were considered menageries and places of leisure for people to view exotic animals from around the world (Kisling, 2001). The London Zoo opened in 1828 with the intention to be used as a collection for scientific study “developed along taxonomic lines, with collections based on representative members of a single genus” (Hosey, et al., 2013, p. 22). The opening of this zoo set a template for ‘modern’ zoos with taxonomic displays and “minimalist enclosures” (Hosey et al., 2013, p. 25). With attention to hygiene, cages were first designed with the keeper’s needs for cleaning and efficiency in mind,

rather than the animal's needs (Hancocks, 2001). The trend towards barren enclosures with wrought iron, "concrete floors and tiled walls" can unfortunately still be seen in some European zoos (Hosey et al., 2013, p. 25). These minimalist created boredom for the animals being housed and promotes increased stress with the slamming of steel doors, "reverberating at a painful level in the hard acoustics of the cages" (Hancocks, 2001, p. 77). By the 20th century, zoos had moved from menageries to living museums/zoological parks, which began to incorporate educational information into the animals on display (Kisling, 2001). Against a background of ever-increasing environmental damage throughout the world, zoo decision-makers began to recognize their obligation to protect species from extinction. In response to this, the World Zoo Conservation Strategy (WZCS) called for zoos and aquariums to become more relevant by delivering messages on conservation (IUDZG/CBSG, 1993), transitioning from menagerie to conservation centre (see Figure 2.1 below).

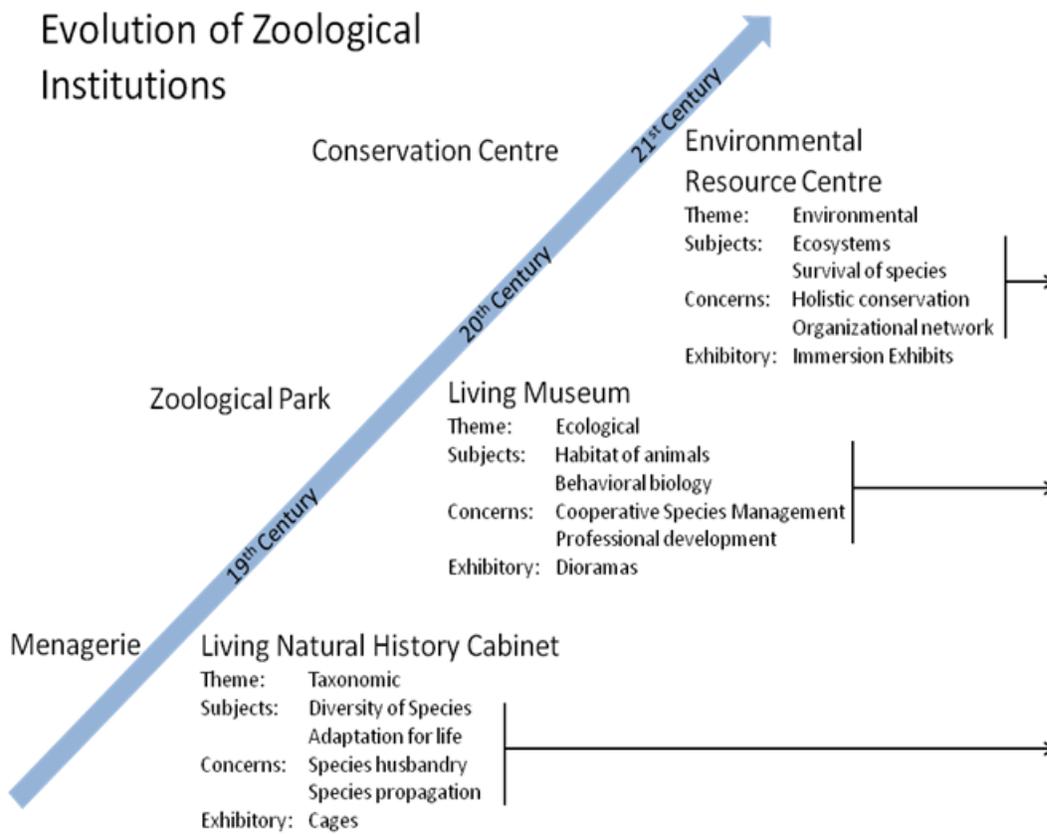


Figure 2.1: Evolution of Zoological Institutions (image adapted from: IUDZG/CBSG, 1993)

Presently, WAZA has declared its main objective is to protect and secure threatened/endangered species and ecosystems (World Association of Zoos and Aquariums, 2006). The traditional role of zoos is to provide recreational facilities and a source of entertainment for visitors. Now, zoos as centres for environmental education, and research into the conservation of wildlife, are becoming more necessary. According to WAZA, the ultimate goal is for all members of the zoological community to contribute to nature conservation through funds and staff (2006). One of the main objectives of accreditation is education, which has been recommended as a central focus for all zoos. WAZA has also stressed the importance of cooperation between zoos and partnership organizations (World Association of Zoos and Aquariums, 2006). Two examples of WAZA supported international organizations are: the

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the International Species Information System (ISIS) (World Association of Zoos and Aquariums, 2015).

There has been a shift in priority of these institutions. They once existed solely for anthropocentric purposes, for the entertainment of the viewing public. Now they emphasize the wellbeing of wildlife both *in situ* and *ex situ*; this led to a change in their mandates.

Zoos exist on both ends of the spectrum, from accredited facilities to low standard, non-accredited ‘roadside zoos;’ the reality of zoos’ existence is that they “are numerous, highly popular, and almost certainly here to stay” (Hosey et al., 2013, p. 38). As Hancocks has said:

The history of zoos is replete with contradictions. People have set up zoos because they wanted to control big strong animals... in recent years there are increasing numbers of people who want to work in zoos because they are passionate about wildlife conservation. (2001, p. xix)

Efforts are being made to encourage modern zoos “to articulate their perceptions of their role and purpose through various positioning statements, aims, objectives, or mission statements” (Hosey et al., 2013, p. 38). These statements are typically published publically, such as through an official website. They share common themes of concern like “education, conservation and providing a valuable experience for visitors” (Hosey et al., 2013, p. 38). For instance, Toronto Zoo states its vision as: “Canada’s national leader in saving wildlife to ensure the rich diversity of nature for future generations” (2015). This zoo, along with other accredited facilities, has established a mandate to preserve and conserve endangered species, and to “help foster public appreciation and interest in the natural world” (Hosey et al., 2013, p. 38).

In North America, both CAZA and AZA work to be ambassadors for endangered species and agents for conservation. This is done through their collections, bringing awareness and educating the public about the natural world while shedding light on the conservation work being done surrounding the species in question. As Hosey et al. note, the cynical response to the rationale behind the existence of zoos is that in many countries they have a “statutory obligation to demonstrate that they are involved in conservation” (2013, p. 39). To operate without such purpose “would be surprising” (2013, p. 39). It cannot be denied that zoos are popular attractions as places for recreation and entertainment. In North America, accredited zoos draw more attendance than professional baseball, basketball, and football games combined (Miller, 2002). This indicates that the modern zoo or aquarium is positioned to provide learning opportunities for the visiting population, whose members cover a broad range of the socio-economic demographic. Emphasizing the change in mission and vision goals of zoos to support conservation must also come with a change to their appearance, to demonstrate a distinction from the exploitative profiteers of animal captivity.

These changes include how zoos and aquariums communicate with the public, whether through their image on and off-site, through outreach efforts or their education programs. Past efforts by zoos and aquariums focused on attracting the public to visit these places from an entertainment standpoint, communicated and advertised as a spectacle. According to Patrick and Tunnicliffe, zoos must focus their intentions “on devising a plan that utilizes enjoyable, entertaining experiences to encourage informal education” to generate desired revenue to support their existence (2013, p. 30). Further, they must implement social marketing strategies that present information regarding their contributions to science and conservation (Patrick & Tunnicliffe, 2013). A creative way one zoo has achieved this is through a partnership with a local

television news station. The North Carolina Zoological Park produces The “Zoo Filez” to provide viewers with a chance to learn about plant and animal species and the zoo’s continuing conservation efforts (Patrick & Tunnicliffe, 2013, p. 30). This is unique as it is a syndicated television series with the potential to raise awareness of the zoo through its broadcasts to the public. Broadcasting to viewers brings attention to the zoo and piquing public interest without an initial motivator from a viewer to seek out the zoo. The challenge for zoos and aquariums is that the “style in which they choose to publicize their scientific and conservation endeavours must be interesting and entertaining” (Patrick & Tunnicliffe, 2013, p. 30).

Informing the public about a zoo’s scientific and environmental initiatives is often done through social marketing. Social marketing in zoos refers to a) the marketing strategies that can be implemented in order to re-conceptualize the public’s perspective about the role such institutions play in conservation and b) public pressures on zoos and aquariums to generate changes in the first place (Kusiak, personal observation; 2012). In the past, communication tactics employed by accredited zoos were targeted exclusively at members through “members-only newsletters, magazines and special events, and renewal mailings” (Kinser & Fall, 2005, p. 1). Mass-media communication outlets such as official websites and, in the last decade, social media networking sites such as Facebook and Twitter provide zoos with opportunities to connect to audiences on a global scale, and across multiple demographics. Social media outlets are increasingly influencing social behaviour and can be used as a tool in communicating to the public information about upcoming and current on-site events while highlighting current conservation initiatives. This form of communication further pushes zoos to maintain accountability and increase transparency.

Other opportunities to raise awareness of the conservation initiatives of zoos are through partnerships and outreach with other like-minded organizations – zoological and non-zoological, local and global. Partnerships between conservation organizations are necessary for their success “as they strive to achieve the ultimate goal of restoring and preserving biodiversity” (Smith, Shaw, Bettinger, Caniglia & Carter, 2007, p. 1). Partnerships can range from species reintroduction and recovery to habitat preservation. Conservation practices with partnerships occur for both *in situ* and *ex situ* efforts. While many experts would argue that the best place to maintain biodiversity is the wild spaces in which plants and animals live, it is now becoming increasingly apparent that this may not be the best option in all cases. *In situ* conservation does not guarantee reliability or safety for certain endangered species, and captive breeding and conservation can only be maintained through zoos and wildlife parks (Hosey et al., 2013). The 1992 United Nations Convention on Biological Diversity (CBD) developed the international conservation treaty as a result of the Rio Earth Summit. This treaty provided specific recommendations on *ex situ* conservation in particular, which has been a catalyst in promoting a conservation agenda within zoos (Hosey et al., 2013). One strategy employed by partnerships involving zoos and conservation organizations is to focus their efforts towards local conservation efforts within the country of origin. For instance, what could be argued as the best-known reintroduction program occurred for the golden lion tamarin. Approximately one-third of the wild population descends from a reintroduction program (Association of Zoos and Aquariums, 2014). This result is due to a combined contribution of *in situ* and *ex situ* practices, which involved Smithsonian National Zoological Park and the Associação Mico-Leão-Dourado in Rio de Janeiro (Association of Zoos and Aquariums, 2014). These efforts have not only led to the reduction in conservation status in 2003 on the International Union for Conservation of Nature

(IUCN) Red List from Critically Endangered to Endangered “but also to the protection of 3,100 hectares of forests within their range” (Association of Zoos and Aquariums, 2014). A slightly different case that involves global conservation efforts is the scimitar-horned oryx. This nomadic species of antelope “once roamed the North African desert, but competition with livestock, drought and desertification drove the species to extinction, but for the populations held in accredited zoos in North America and Europe” (Bento, 2014, para. 7). Successful management of breeding programs in captivity has positioned this species to make a comeback. The issue faced by conservationists has been “establishing safe areas to reintroduce the oryx” (Bento, 2014). “A small reintroduction in Tunisia placed about 500 in a fenced-in range” (Bento, 2014). Now AZA members are forming partnerships in Africa to devote “a large unfenced area in the hope that the oryx can someday roam free again” (Bento, 2014). Partnerships are also being formed between commercial organizations and zoos, as many of these organizations recognize the impact wildlife conservation (or degradation) can have on industries like tourism and pharmaceuticals.

For many non-profit organizations (NGO), donations are imperative in order for them to continue meeting their mandates and goals. Financial support to non-profit accredited zoos comes from site visitors, government, external organizations or private and commercial/corporate donors. Sponsorship can provide marketing benefits like on-site advertisements, exhibit areas, special events or specialized education and sustainability initiatives. This, in turn, pays great dividends for the sponsor in terms of marketing opportunities and public image. For example, the Coca-Cola Company has partnerships with 33 percent of zoos and aquariums in North America making it the most active sponsor in terms of numbers (IEG Sponsorship Report, 2013). While this has benefited the Coca-Cola Company by increasing

awareness of their product and improving their public image, much of the funding has been focused on conservation efforts benefitting charismatic species, which is largely due to advertising efforts on the part the company. While there is no uniform definition, Ducarme, Luque and Courchamp describe charismatic species as “large mammals and vertebrates with some attractive traits for the human population considered, such as intelligence, beauty, valour, singularity or a strong symbolic [characteristic]...” (2013, p. 6). Examples of charismatic species include: elephants, rhinoceros, polar bears, and panda bears. It is much easier to sell products using images of charismatic animals and to improve public image by supporting them. Any support received by zoos for conservation programs for any species is encouraged; nevertheless charismatic species receive a disproportionate amount of the financial support available to zoos (Leader-Williams, Adams & Smith, 2010).

Visitors are an integral component of zoos’ “operation and success, in order to achieve their stated objectives. Visitors are the target audiences for zoos’ educational initiatives, as well as being the primary funding source for any conservation work” (Hosey et al., 2013, p. 462). As a result, it can be assumed that zoo decision-makers would take appropriate actions and efforts to maximize attractiveness to visitors in order to provide an enjoyable experience that is also consistent with meeting their mandates of welfare, education and conservation (Hosey et al., 2013). A survey conducted by WAZA revealed that more than 700 million people visit zoos and aquariums worldwide each year (Gusset & Dick, 2011). With this statistic in mind, while some visitors come for recreational reasons, other visitors come with the intention to learn about the animals they see. A study by Kreger and Mench found that visitors are highly motivated to view animals, and interactive opportunities such as animal demonstrations and shows can impact a person’s knowledge and awareness of animals and conservation (1995, pp. 145-146). These

opportunities can provide visitors with “an immediate and positive experience of animals,” which can be seen as a justification for the existence of zoos and aquariums (Hosey et al., 2013, p. 463).

Another way that zoos educate and disseminate wildlife conservation messages to the public is through the recruitment of volunteers. Zoos and aquariums provide volunteers with training to learn about animals and develop interpretive skills required for engaging with the public. Adult volunteers engage in formal, curriculum-based learning opportunities, as well as informal learning opportunities, such as interacting with visitors at educational stations. Volunteers are also involved in special circumstances with assisting wildlife staff in animal observations, to “...gather data, and record observations...” (Cohn, 2008, p. 192).

Modern zoos and aquariums also serve as agents of global environmental education and conservation, which includes natural resources, plants and animals. Zoos and aquariums of the past were limited to passive learning experiences. However, with education serving a compulsory purpose in the mission and visions of modern zoos, learning opportunities have evolved to engage the visitor with interactive and memorable learning experiences.

2.2 A Modern Mandate: Education and Zoological Institutions

Changes to the planet brought on by global climate change, pressures on ecosystems, demand for natural resources, and the long-term consequences of ecological pressures have reinforced awareness about the necessity for environmental education for children and adults. Zoos can provide a platform for delivering messages of animal conservation and environmental education. However, to effectively educate the public on environmental and conservation issues in order to achieve the intended results, it is important to understand the pedagogy of learning.

This section of the literature review presents a general overview of the changes in pedagogy from passive learning to experiential learning. Environmental education can be conveyed through different pedagogical approaches to learning drawing on the theoretical framework of Pierre Walter's 2009 "Philosophies of Adult Environmental Education." Criteria derived from Walter's work will be applied in a later chapter in order to assess the effectiveness of the environmental education programs in the three case study sites. The chapter concludes with an overview of contemporary efforts made by zoos to educate and raise awareness in the general public.

2.2.1 Action and Reflections: The Role of Experiential Education

Pedagogical research has shown that learners of all ages have "higher cognitive outcomes" if they are actively involved in the learning process as opposed to simply being passive receivers of information (Michel, Cater & Varela, 2009, p. 65). This has led to a transitional movement away from the traditional, teacher-centred approach and towards learner-centred experiential learning. Experiential learning occurs over a wide-range of educational experiences, from community service work and internships to participation in faculty research (McKeachie & Gibbs, 1999). Experiential learning is recognized, "as an active process of grappling with conditions and problems in the world; constructing and testing solutions; and interacting with others to make sense and make progress" (Moore, 2010). Furthermore, experiential education can be described as the creation of knowledge through a transformational experience (Dewey, 2007; Kolb, 1984; Rogers, 1983). As Dewey mentions, it is not enough just to have an experience; the experience must be exciting, develop desirable attitudes and connect with other experiences presented for the learner (2007). Experiential learning involves meaningful interaction with "a concept or

phenomenon” (Millenbah & Millspaugh, 2003, p. 127). American educational theorist David Kolb has been one of the leading members in establishing the experiential education movement, and as such, in 1984 presented a cyclical model of experiential learning. Experiential learning begins with encountering a new action or experience and observing its effect. This step is followed by reflective observation, “with the eventual goal of being able to anticipate what would follow the action in another circumstance” (Millenbah & Millspaugh, 2003, p. 128). The remaining two steps in the cycle include “understanding the general principle under which the instance falls and application through action in a new circumstance” (Millenbah & Millspaugh, 2003, p. 128). This entire process follows Kolb’s four-step model: experiencing concretely, reflective observation, forming abstract concepts, and active testing (see Figure 2.2 below).

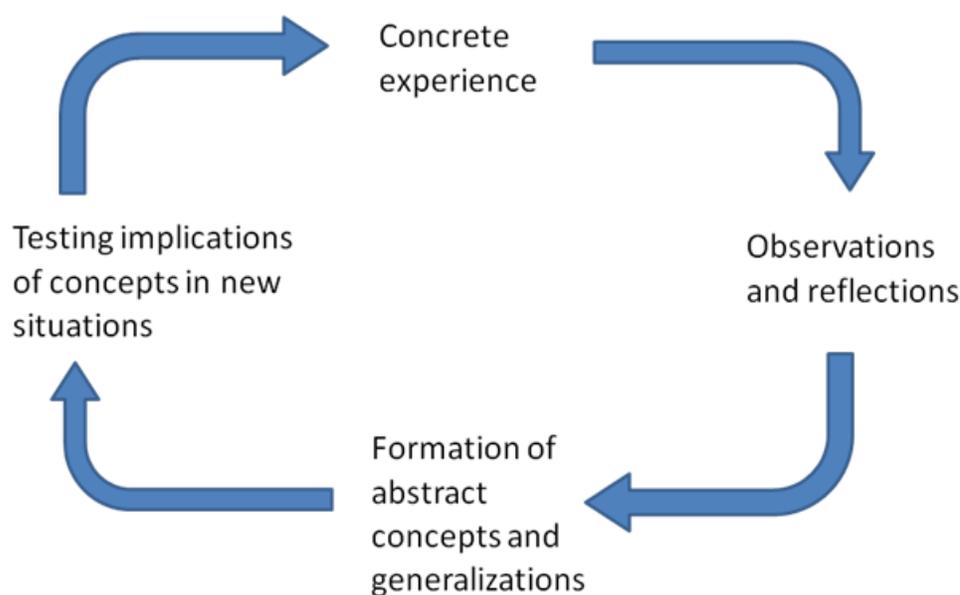


Figure 2.2: Kolb’s Learning Circle (image adapted from: Kolb, 1984)

Most students have exposure to experiential learning opportunities at a young age (Millenbah & Millspaugh, 2003). In elementary school “a high proportion of experiential learning is employed through the use of games, play, and individual performances” (Millenbah &

Millspaugh, 2003, p. 128). In junior high and high school experiential learning is replaced by passive learning through lectures. In post-secondary education “exposure to experimental learning increases; however, this exposure generally occurs in targeted classes (e.g., chemistry laboratories) or individual learning opportunities (e.g., internships)” (Millenbah & Millspaugh, 2003, p. 128). One of the more persuasive reasons for implementing experiential learning in formal and non-formal learning environments is that it can accommodate a variety of learning styles. The main goals of experiential learning are: “to broaden, extend, and deepen the intellectual content of instruction by integrating theory and practice, to increase student motivation through the experience of applying knowledge, and to encourage students to develop their skills as independent scholars” (Davis, 1993; Millenbah & Millspaugh, 2003, p. 128). There is not a default pedagogy or standard curriculum for achieving this; it is, however, important to determine what pedagogical approaches could best serve to inform public environmental education programs (Walter, 2009).

While adult environmental education holds “great promise,” for research advancements, environmental education research and theory in academia is still in its early stages (Walter, 2009, p. 4). The majority of what is considered environmental education is still primarily relegated to efforts directed at children in the K-12 schooling system or with university programs (Walter, 2009, p. 4). Walter's work focuses on the effective environmental education of adults. Walter's structural foundation offers “five different philosophical traditions in environmental education for adults” (Walter, 2009, p. 2). The five philosophies are: liberal, progressive, behaviourist, humanist, and radical. All five classifications can be found in adult environmental education, but “liberal, behaviourist, and humanist – although widely enacted in practice, are, by contrast, largely absent in the academic literature of adult education” (Walter, 2009, p. 21).

The liberal tradition is based on a belief system that the expansion of knowledge and understanding comes through a liberated mind and all human beings are capable of reasoning with a rational mind (Walter, 2009). This tradition stresses the development of intellectual “power of the mind,” as the individual learner is believed to be a liberated person eager to learn (Walter, 2009, p. 5). Typically the curriculum associated with this tradition is organized knowledge with the assessment centered on the intellectual development of the learner (Walter, 2009). It emphasizes “mastery” of the content with the educator viewed as an expert, and where knowledge flows in one direction from a top-down approach from the instructor to the learner (Walter, 2009, p. 8).

The progressive tradition adopts a learner-centered approach for seeking solutions, change and the “social reform” role of education (Walter, 2009, p. 5). The role of the instructor is as a facilitator who guides the learner through their educational experiences (Walter, 2009). Furthermore, there is an emphasis on problem solving, experience based education, and “lifelong learning” (Walter, 2009, p. 11).

The behaviourist tradition centers on behaviour modification and a “controlled learning environment” (Walter, 2009, p. 5). The tradition considers human behaviour is tied to “prior conditioning,” and external forces control all human behaviour (Walter, 2009, p. 5). The instructor acts as a “contingency manager” who predicts and controls the learning objectives and “desired behaviour” (Walter, 2009, p. 5). Assessment for this tradition includes behavioural conditioning, feedback, drill and practice (Walter, 2009).

The humanistic tradition romanticizes human nature to believe that humans are “essentially good” with “unlimited potential” (Walter, 2009, p. 6). It stresses the concept of self-direction in learning with a motivation for personal growth (Walter, 2009). This tradition focuses

on the “humanities curriculum” and the facilitation of “self-actualization” of the individual learner who is by nature intellectually gifted (Walter, 2009, p. 6). The instructor, similar to the progressive tradition, acts as a facilitator who promotes, but does not direct the learning (Walter, 2009). Additionally, this tradition also promotes self-awareness, experiential learning, individuality, and cooperation (Walter, 2009, p. 6).

Finally, the radical tradition is based on an assumption that “humans are active agents in constructing the world” to create meaning, and that knowledge leads to an understanding of reality, which helps to bring about the necessary change (Walter, 2009, p. 7). The fundamental role or purpose of education is to bring about a radical liberation from “social, economic, and political oppression” in society through critical knowledge, training and education (Walter, 2009, p. 7). Its emphasis is on human agency, which can act towards a particularly desired change or goal; it mainly emphasizes the “transformative” role of education and radical social change (Walter, 2009, p. 18). It highlights equality between the teacher and the learner and stresses personal autonomy for both the learner and the instructor (Walter, 2009, p. 7). Its basic belief is that people create “history and culture” by combining “reflection with action” (Walter, 2009, p. 7). This tradition only suggests but does not determine the direction for learning and it is left open for interpretation between the facilitator and the learner. The radical tradition can assist learners in achieving “critical consciousness” (Walter, 2009, p. 7).

Walter’s article notes that presently only the “radical philosophical tradition of adult environmental education has a strong presence in scholarship in adult education” (Walter, 2009, p. 21). Further, Walter suggests, “case studies would be very valuable, for instance, on informal education in zoos, nature centers, aquariums, and so on in the liberal tradition” (Walter, 2009, p. 21). However, informal education programs at zoos are beginning to shift towards the

progressive tradition through the use of biofacts and demonstrations that involve the visitors, making them participants rather than observers.

This research project involving the Calgary Zoo, the Toronto Zoo, and Vancouver Aquarium provides insight into what possible models for effective environmental education programs could be adopted by public and private institutions. Such an approach is important because education is one of the four major purposes of modern zoos and aquariums. Thus, it is not surprising that it is a fundamental factor in their mission statements (Patrick, Matthews, Ayers & Tunnicliffe, 2007). 'Education' within zoos can range from informal to formal learning. An example of how zoos can present information to visitors while creating "passive learning experiences is through the provision of informative signs, which can be produced to interest visitors of all ages" (Hosey et al., 2013, p. 468). However, opportunities for formal learning are becoming more common in zoos and aquariums with the development of "more structured forms of instruction, ranging from keeper talks, demonstrations to school and college visits and short courses" (Hosey et al., 2013, p. 468). Educational departments in zoos are responsible for educational, interpretive training, and outreach work. As such, they have become essential departments in modern zoos and aquariums.

A survey conducted at Wellington Zoo in New Zealand discovered that visitors identify education as an important role of zoos but also believe entertainment to be a major function (Mason, 2007). The study also revealed a lack of knowledge and awareness of the conservation role of modern zoos and aquariums (Mason, 2007). One reason for this, offered by Carr and Cohen, is that zoo and aquarium websites emphasize entertainment more than conservation, and the communication of conservation work is described superficially (2011). This study evaluated the websites of 54 different zoos from around the world, and found, for instance, that more of

them advertised the opportunity for birthday party events than provided education materials related to conservation or research related to the zoo. Despite the fact that zoos may understand the distinctions and connections between conservation, education, and entertainment, assumptions cannot be made that they are as obvious to the general public (Fraser & Sickler, 2008). This leads one to wonder how successful zoos are at achieving education objectives. Although this question is certainly an important one, few AZA zoos have attempted to assess the effectiveness of their education initiatives, mainly because of limited resources (Luebke & Grajal, 2011).

As previously mentioned in this section, most zoos and aquariums offer structured educational opportunities both to visitors and to students on organized visits via such activities as keeper talks, close encounters, etc. (Hosey et al., 2013). Opportunities for workshops and courses on conservation, sustainability, and zoological research with professionals and collaborations with public and private institutions and business are also available (Hosey et al., 2013). In certain circumstances environmental education programs are offered to engage the public in wildlife conservation research as well. For example, the Toronto Zoo hosted the largest biological inventory, or biological census (also known as a 'Bioblitz') in Canadian history for the Rouge Park, encouraging interactions between both the local community and the scientific community (Toronto Zoo, 2013). School and post-secondary tours include 'hands-on' sessions with live animals or the examination of biofacts (for example, pelts and skulls), which teachers rate to be the most valuable part of the visit (Woollard, 2001).

Since visitors to zoos enjoy opportunities to see live and active animals, it is likely that time spent at an exhibit will increase if there is a presentation or demonstration by a keeper (Hosey et al., 2013). Studies have shown that visitors are more engaged and will spend more

time learning at live demonstrations (keeper talks) or interactions (interpretations, close encounters) with animals as compared to passive learning on signage and the traditional exhibit (Broad, 1996; Perdue, Stoinski & Maple, 2012; Povey & Rios, 2002). However, it should be noted that the use of animals for interactive displays “opens up a realm of ethical and potentially welfare issues” (Hosey et al., 2013, p. 471). Striking a balance between animal welfare, environmental education, and entertainment will be essential for zoos moving forward.

2.3 Entertainment versus Education: Questioning the Conservation Message

It has been argued that zoos and aquariums play an important role “in educating the public about animals and nature in general,” but their role in conservation education is of particular importance (Hosey et al., 2013, p. 471). WAZA refers to ‘conservation education’ as “the principles of environmental education and education for sustainability” (2005, p. 36). Modern zoos and aquariums strive to promote animals in their collection as ambassadors for their wild counterparts and the conservation issues surrounding them. The act of visiting a zoo or aquarium alone, however, does not guarantee a change in a person’s behaviour. Improving visitor knowledge and awareness is one thing, catalyzing a change in behaviour is all together different (Hosey et al., 2013, p. 473). Changes in behaviour are also challenging to measure, as people may not distinguish “small changes in their behaviour as a result of [a zoo’s] education to be anything to do with conservation at all” (Hosey et al., 2013, p. 473). Psychologist Steven Yalowitz’s study at California’s Monterey Bay Aquarium found conservation education to be most successful for visitors if manageable courses of action could be undertaken that were consistent with their present lifestyle (2004). For instance, visitors could take home a ‘Seafood Watch’ pocket guide, which lists sustainable seafood to buy in restaurants and grocery stores and

an ‘Ocean Allies Card’ detailing the various conservation organizations they could become members of. However, it was found that visitors were more interested in learning how to change their seafood consumptive habits than in joining a conservation organization (Yalowitz, 2004).

The educational impact of zoos has been investigated by an AZA three-year project during which the researchers “surveyed the literature, held public forums with a selection of AZA institutions, and interviewed zoo visitors” (Falk et al., 2007; Hosey et al., 2013, p. 473). The findings showed that visits to zoos and aquariums do raise awareness and promote nature conservation. Visitors also came to these institutions with more ecological knowledge than expected (Falk et al., 2007). The assumption is that these zoos were “supporting and reinforcing the existing values and attitudes of the visitors” (Falk et al., 2007; Hosey et al., 2013, p. 473). While this finding bodes well for zoos, the reality is that the majority of those coming to visit these places still come for its recreational value. The challenge then is the ability of zoos and aquariums to “deliver the conservation message within that enjoyable experience” (Hosey et al., 2013, p. 473). However, a study by social ecology scholar Stephen R. Kellert shows that the typical zoo visitor was less environmentally knowledgeable than those who directly interact with nature, like hunters, hikers, fishers, etc. (1984). What is more, Kellert asserts that the average zoo visitor is barely more environmentally conscious compared to someone with little to no interest in animals whatsoever (1984). This brings into question the effectiveness of the education programs in zoos.

Ultimately, the vast majority of educational initiatives that zoos and aquariums bring forward are intended for children or for the general visitor (Hosey et al., 2013). However, it has been argued that these groups may not be the most “appropriate target” (Hosey et al., 2013, p. 474). Zoologist and conservationist, William Conway has suggested that more attention should

be directed to policy-makers with the intention of influencing their attitudes and actions (2007).

While the children of today will determine the policies of years to come, our immediate future is decided by the policy makers of today (Conway, 2007).

With the destruction of animal species, and the “natural environments in which these species adapt and evolve [in] over time,” it is crucial for zoological institutions to communicate conservation messages about animal habitats and not just the flagship species that inhabit them (Hancocks, 2001, p. 155). Natural habitats are home to many varieties of species, particularly microorganisms and bacteria that facilitate chemical processes that make our planet comfortable and habitable for us. Humans show a tendency to favour species and natural environments that appeal to our cultural bias, whether they are colourful, exotic, freakish, or beautiful (Hancocks, 2001). An obvious demonstration of this principle is the multitude of conservation and protection initiatives devoted to national parks (Yosemite, Yellowstone, etc.) In contrast, it was not until 1947 that a swamp habitat in the Everglades was given a similar type of protection (Hancocks, 2001, p. 154). Further, as mentioned by Hancocks: “Zoos deal with only a tiny fraction of the world’s fauna. Moreover, they concentrate almost entirely on breeding the species that are important for zoos, not those important to Nature.” (2001, p. 152).

If zoos are to be leaders in world conservation efforts, they must broaden their approach, looking to conserve natural environments and all their inhabitants, not just the handful of flagship species that attract visitors to their facility. Even the abuse of the word ‘conservation’ by zoos, in pamphlets and signage, shows the distorted perception of what zoos accomplish through breeding programs or facility expansions (Hancocks, 2001). They are “damaging overstatements” that suggest by opening a new facility they are forwarding conservancy initiatives, when most of what is accomplished is economic advancement for the zoo as a business (Hancocks, 2001, p.

152). Zoos, if they wish to work towards conservation of wildlife and nature, should focus on local initiatives and their immediate environment, where progress towards conservation of nature truly takes place.

2.4 Summary

Zoos continue to prove their popularity in their ability to attract visitors from all over the world. This position allows zoos to provide opportunities to influence and inform members of the public about wildlife and wild spaces. Zoos and aquariums have transformed since their beginnings in the 19th century as menageries to places for conservation, research, and environmental education.

With the agenda focused on ecocentric perspectives, education within zoos is a major component in informing the public about their conservation initiatives. The public has opportunities to learn about both *in situ* and *ex situ* efforts involving the animals that they observe. In the past, opportunities for learning in zoos and aquariums were restricted to informal learning experiences such as seeing the animal and reading the signage. However, zoos are increasingly implementing more formal learning practices. These more structured forms of teaching include keeper talks and outreach demonstrations, to tours and courses for post-secondary institutions. The shift from passive learning to experiential learning opportunities reflects the new mandates of accredited zoos, which emphasize the importance of environmental education to indicate the significance of nature conservation locally and globally.

Although accredited zoos promote endangered species conservation, it is still a contentious issue regarding whether their messages in education are reaching the public effectively. One of the challenges associated with this issue is the difficulty in measuring changes in public attitudes and behaviours towards a conservation ethic as a direct result of their

visit to a zoo or aquarium. Nonetheless, accredited zoos are continuing to improve their position as leaders in protecting endangered species.

This thesis investigates the degree to which zoos are implementing effective experiential education in order to foster conservation. As discussed above, deep learning is best achieved through experiential learning. The following chapter examines if zoos have an impact on learning and instigate behavioural changes in those who visit them. In order to do so, the chapter considers the relevant criteria of good experiential learning.

3.0 Conservation, Education, and Outreach in Zoological Institutions

Accredited zoos and aquariums are striving to improve the visitor experience to allow for greater accessibility and enhanced educational opportunities. The experience of live animal encounters offered by zoos places them in a special position to present authentic learning experiences to the public. To operate within accreditation standards, zoos must serve their foundational mandates, one of which is education. Educational resources offered to visitors are designed to connect the individual to wildlife conservation through informal and formal learning practices.

This chapter begins with an explanation of what is meant by effective learning and transformational learning. This is important because education programming offered by zoos will only work if the public's understanding of wild animals and their habitats are enhanced in a way that transforms both attitude and behaviour towards conservation. An exploration of experiential education offered by zoos will be followed by a discussion of what these facilities are doing to communicate to the public the importance of species conservation.

3.1 What Do We Actually Mean by Learning?

Humans have the capacity to learn in many different ways. Sometimes we are simply told and are expected to remember. Other times we must perform a task or procedure in order to learn. The effectiveness at which we learn has allowed for us to survive as a species. Humans “rely more on learned skills than on innate dispositions” (Ohlsson, 2011, p. 15). This reliance on “learned over innate skills” allows for our ability to adapt to new circumstances (Ohlsson, 2011, p. 15). The mechanism of learning is looking for patterns in our environment through personal experience or the experience of others, identifying those patterns, projecting those patterns to

future events and acting appropriately in response (Ohlsson, 2011). However, we do not all process the mechanism of learning uniformly.

Developmental psychologist Howard Gardner created the theory of multiple intelligences, which suggests that there are seven distinct intelligences to learning, rather than a singular style (Gardner & Hatch, 1989). The seven learning styles are: visual-spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, linguistic, and logical-mathematical (Gardner & Hatch, 1989). Although each measure of intelligence is “relatively independent” with its own strengths and weaknesses, Gardner opposes the idea of classifying learners to a single intelligence (Gardner & Hatch, 1989, p. 5). The combination of these different intelligences allows for individuals “to carry out different tasks, solve diverse problems, and progress in various domains” (Gardner, 1991, p. 12). These differences as mentioned by Gardner:

[C]hallenge an educational system that assumes that everyone can learn the same materials in the same way and that a uniform, universal measure suffices to test student learning. Indeed, as currently constituted, our education system is heavily biased toward linguistic modes of instruction and assessment and, to a somewhat lesser degree, toward logical-quantitative modes as well. (1991, p. 13)

Gardner’s theory offers a shift from the ‘one size fits all’ mentality to the adaptation and understanding of individualized learning. Despite changes in pedagogy towards more inclusive teaching and learning practices, the dominant assessment of intelligence is focused around standardized examinations. Recognizing and embracing diversity in teaching and learning experiences is necessary in order to serve changing learning styles to provide equitable opportunities for all through effective educational programming.

While ‘effective teaching’ may be a contentious term, researchers do agree that it is “oriented to and focused on students and their learning” (Devlin & Samarawickrema, 2010, p.

112). Chickering and Gamson offer key characteristics for effective teaching and learning, which among other things emphasizes reciprocity and cooperation between learners and teachers, encourages active teaching, and respects diverse talents and ways of learning. Conversely, Ken Bain emphasizes the importance for teachers and their ability to create a “natural critical learning environment” where students learn by confronting intriguing problems and authentic tasks and grapple with their own ideas and assumptions (2004, p. 18). The above-mentioned key characteristics contribute to the creation of “environments where effective learning is very likely to happen” (Ellis et al., 2011, p. 6).

Pierre Walter’s structural foundations in adult environmental education, as mentioned in Chapter Two, offers a an understanding of how diverse philosophical traditions (liberal, progressive, behaviourist, humanistic, radical, or a combination of both) can serve as models for future effective environmental education programs in both public and private institutions. When educators suggest public education is a means “to meet an environmental management goal, the education strategy must go beyond simplistic solutions to be effective” (Andrews, Stevens & Wise, 2002, p. 174). The intention of “meaningful education is to provide the context and relevance recognized by the learner and to generate the opportunity for the learner to apply knowledge to the environmental problem” (Andrews, Stevens & Wise, 2002, p. 174).

To facilitate the objective of meaningful environmental education, the liberal philosophy is still the principal philosophy employed in formal education. The purpose of the liberal philosophy is focused on “both the expansion of intellectual knowledge and the development of an enlightened moral and cultural sensibility in learners” (Walter, 2011, p. 8). The assumption from the teacher’s perspective is the learner “function[s] more thoughtfully” in their capability to be rational, sensible thinkers with the ability to “absorb new knowledge” (Walter, 2011, p. 8).

The liberal philosophy relies on “faith in the power of knowledge” for transformation to occur in the learner’s knowledge and provoke changes in their behaviour towards the protection of nature (Walter, 2011, p. 8). This tradition alone is not enough to meet the mandate of meaningful environmental education. The reliance of dispensed information on hand to be sufficient to incite effective changes in individual behaviour is not enough. Thus, the incorporation of experiential learning and deep learning coupled with the foundations of the liberal tradition has the potential to generate effective educational opportunities at zoos that create behavioural change in the learner through experiences. Examples of visitor experiences available at zoos include Keeper Talks, and engaging with volunteers at interpretive stations and other displays. This offers an interactive education experience for visitors beyond the spectacle of the animal.

Experiential learning is simple in of itself because it is based on the principle that people learn through experiences. Teacher and educationist, Norman Evans defines experiential learning as “the knowledge and skills acquired through life and work experience and study which are not formally attested through any educational or professional certification” (1994, p. 1). The concept of ‘learning through doing’ allows the individual to be actively involved in the learning process rather than being a passive receiver of information. Supporters of experiential learning assert that individuals are empowered by what they learn through this process and its contributions “to growth and development can have profound consequences for the role they play in society” (Evans, 1994, p. 4). An individual’s self-confidence in their capacity to learn “can enable them to take greater control over their lives” and apply what they learn to real-world scenarios (Evans, 1994, p. 4).

Furthermore, experiential learning can lead to deeper learning and changing behaviours. Deeper learning transforms the way in which an individual thinks about the world and their

improved ability “to transfer what they have learned in one context to another context” (Centre for Teaching Excellence, 2015). This fosters greater learning, as opposed to administering content. Thus, if teachers opt for an experiential learning approach they may not complete all of their intended course units. It is, however, reasonable to assume that students will have the capability to comprehend the remaining unit(s) “on their own because of their deeper understanding of the other units” (Centre for Teaching Excellence, 2015). If experiential learning occurs, it means that deep learning can happen. By retaining what one learns and doing something with what has been learned, a change in behaviour has taken place, possibly one that indicates transformational learning experience. While experiential learning may be a challenge to established practices in education, it goes beyond the focus of the superficial approach to learning. It offers a much more rewarding encounter for the teacher and the learner to grow and offers a “way of trying to change society,” which is what our educational system is in need of (Evans, 1994, p. 4).

Both experiential learning and deep learning help to delineate the parameters of a good learning approach. Recognizing students’ preferences for engaging in learning by “*doing* rather than *listening*,” so-called ‘authentic learning’ is becoming an effective teaching tool for educators in and out of the classroom (Lombardi, 2007, p. 2). Similar to deep learning, authentic learning focuses on real-world applications and goes beyond course content to incorporate “multiple disciplines, multiple perspectives, ways of working, habits of mind, and community” (Lombardi, 2007, p. 3). The convenience of the Internet coupled with the emergence of effective “communication, visualization and simulation technologies... offer students authentic learning experiences ranging from experimentation to real-world problem solving” (Lombardi, 2007, p. 1). While much of what makes for authentic learning is dependent on accessibility to online research

communities, the “connection-building” is the driving force behind tapping into a “deeper sense of a discipline as a special ‘culture’ ... of seeing and interpreting the world” (Lombardi, 2007, p. 2).

Learning researchers have refined a list of 10 design elements for educators to adjust to any subject matter as a tool for creating what some refer to as an authentic learning experience for students.

1. ***Authentic activities have real-world relevance:*** Authentic activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualized or classroom-based tasks.
2. ***Authentic activities are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity:*** Challenges are open to multiple interpretations and are not easily solved by the application of existing algorithms. Learners must identify for themselves their own unique tasks and sub-tasks necessary to complete the major task.
3. ***Authentic activities comprise complex tasks to be investigated by students over a sustained period of time:*** Activities cannot be completed immediately in a short period of time; rather they are comprised of complex tasks to be investigated over a sustained period of time. They require a significant investment of time and intellectual resources.
4. ***Authentic activities provide the opportunity for students to examine the task from different perspectives, using a variety of resources:*** Tasks can be approached from multiple theoretical and practical perspectives and as such, there are no preselected resources given to learners. This requires students to distinguish relevant from irrelevant information in the process.
5. ***Authentic activities provide the opportunity to collaborate:*** Collaboration is integral to the task, both within the course and the real world, rather than achieving success by an individual learner.
6. ***Authentic activities provide the opportunity to reflect:*** Activities enable learners to make choices and reflect on their learning both individually and socially.

7. ***Authentic activities can be integrated and applied across different subject areas and lead beyond domain-specific outcomes:*** Activities are not confined to a single well-defined field or domain. Instead, activities encourage interdisciplinary perspectives and enable diverse roles and skills.
8. ***Authentic activities are seamlessly integrated with assessment:*** Assessment of activities is seamlessly integrated into the major task in a manner that reflects real-world assessment, rather than separate artificial assessment disconnected from the nature of the task.
9. ***Authentic activities create polished products valuable in their own right rather than as preparation for something else:*** Activities culminate in the creation of a whole product, valuable in its own right rather than an exercise or sub-step in preparation for something else.
10. ***Authentic activities allow competing solutions and diversity of outcome:*** Rather than creating a single correct response obtained by the application of rules and procedure, activities allow for diverse outcomes and competing solutions. (Lombardi, 2007; Reeves, Herrington & Oliver, 2002)

Some researchers have found that authentic learning motivates students, despite disorientation or frustration, and allows them to persevere through difficulties with the style of learning because these learning practices simulate what occurs in practice; structures and the culture of their field of interest are taught in addition to content necessary to contribute to the field (Herrington, Oliver & Reeves, 2003).

An ideal learning experience, when based on the above criteria for authentic learning, ideally should provide a humanistic approach to learning. This learner-centred approach emphasizes that change comes from within the individual. This approach inspired by David Orr suggests, “the goal of education is not mastery of subject matter, but of one’s person” (Orr, 1991; 1996, p. 4). The need for learning must match the individual’s desire to learn. For the purposes

of this thesis, the criteria for authentic learning as presented by various pedagogical researchers discussed above is used to assess the efforts of zoos to achieve their conservation mandates through environmental education. These educators and others have been discussing zoos through the lens of experiential education. This research goes one step further to investigate specific zoos and the environmental education of their visitors.

3.2 Implementation of Programming to Achieve Conservation

Progressive zoos and aquariums are introducing different methods to advance their education goals, given their changing mandates that increasingly emphasize conservation of endangered species and habitat preservation. Efforts include both *in situ* and *ex situ* efforts that range from educational programs to scientific research involving partnerships with similar organizations in order to foster conservation initiatives. In recent years, the prioritization in zoos of “active involvement in conservation” has led to greater involvement in field conservation projects (Hosey et al., 2011, p. 333). Increased threats to species and natural habitats due to human depredation and climate change present zoos and aquariums with the potential to “become more prominent” in conservation and education in biodiversity (Hosey et al., 2011, p. 333).

Education, training and public awareness have long been recognized as fundamental “tools in bringing about effective conservation and sustainable development” (Whitehead, 1994, p. 665). Building on the 2010 International Year of Biodiversity, the United Nations General Assembly declared 2011-2020 to be the United Nations Decade on Biodiversity with “the goal of significantly reducing biodiversity loss” (United Nations General Assembly, 2010, para. 6). A large-scale impact evaluation study was conducted by Moss, Jensen and Gusset, which builds on the United Nations Strategic Plan for Biodiversity 2011-2020 to “evaluate biodiversity literacy”

in zoo visitors (2015, p. 537). The study stands to date as the “largest and most international study of zoo and aquarium visitors ever conducted” surveying 5661 participants from 26 zoos and aquariums from 19 countries around the world (Moss, Jensen & Gusset, 2015, p. 537). Surveying visitors pre- and post-visit showed an increase in visitor knowledge towards understanding biodiversity (Moss, Jensen & Gusset, 2015). The increase from pre-visit (69.8 percent) to post-visit (75.1 percent) showed a significant and positive increase (Moss, Jensen & Gusset, 2015). Comparable results from pre-visit (50.5 percent) to post-visit (58.8 percent) increases were also noticeable in participants “who could identify actions to help protect biodiversity that could be achieved at an individual level” (Moss, Jensen & Gusset, 2015, 537). The results of this study stress the potential impact zoos have as “public engagement institutions dedicated to halting and eventually reversing the loss of biodiversity on the planet, as called for in the United Nations Strategic Plan for Biodiversity 2011-2020” (Moss, Jensen & Gusset, 2015, p. 544). The United Nations Conference on Sustainable Development, or Rio+20, took place in Rio de Janeiro, Brazil in June 2012, which marked the 20th anniversary of the 1992 United Nations Conference on Environment and Development (United Nations Conference on Environment and Development, 2011). The Rio+20 conference focused on two themes, one of which was “the institutional framework for sustainable development” (United Nations Conference on Environment and Development, 2011, para. 4). Within this framework is the continued “commitment to fully implement the Rio Declaration on Environment and Development, Agenda 21,” which first identified the importance of education and the necessary actions involved in its implementation towards sustainability education (United Nations Conference on Environment and Development, 2012, p. 3).

The planet is currently in the midst of a period of massive biodiversity loss: “a sixth mass extinction episode” (Uozumi, 2010). According to the Millennium Ecosystem Assessment, the current extinction rate is up to one thousand times higher than the fossil record (2005). Although extinction rates of species differ by ecoregions and countries, Canada has suffered an extensive number of species losses (Kusiak, 2012). Within Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) considers over 640 species to be at risk of extinction (2011). The number of endangered species is also on the rise. Canada, like many countries worldwide, has not just experienced impacts to the environment within the country itself, but has also contributed to global environmental impacts on wildlife and wild spaces (Kusiak, 2012). Thus, it is becoming increasingly imperative to find ways of creating more active concern for biodiversity conservation inside and outside Canada, and raising public awareness is key (Kusiak, 2012).

Zoos are “the only institutions to keep collections of living (wild) animals (often) from all over the world” (Whitehead, 1995, p. 665). According to the United Nations, humans officially became an urban species in 2007 with over half of the world’s population occupying cities (United Nations Population Fund, 2007). The United Nations also estimates that by 2030, 60 percent of the world’s citizens will be living in cities (United Nations Population Fund, 2007). For zoos this means that they are positioned to offer unique “unparalleled opportunity to experience wildlife at close quarters” (Whitehead, 1994, p. 665). An advantage for zoos and aquariums is that they are egalitarian in their draw of “visitors from a wider cross section of society than, say museums, historic attractions or comparable places” (Whitehead, 1994, p. 666). Zoo educators interact with multiple target audiences with the potential to “develop concepts,

refine skills and nurture attitudes about the natural world, our impact upon it and responsibilities for it” (Whitehead, 1994, p. 666).

In a 40 year study conducted by Davey, it was found that zoos around the world had attendance rates correlated with the gross national income (GNI) of the country (Davey, 2007). In particular, North America had an attendance rate correlated with its GNI, which suggests that families and individuals with higher income are more likely to attend zoos. Falk et al. also note that visitors to zoos come with a higher than expected knowledge about basic ecological concepts (2007). This creates a general profile for the adult individuals entering North American zoos, and can be applied to the case studies in this thesis.

On-site zoo and aquarium educators have the opportunity to facilitate formal and non-formal learning public programs. Some programs run seasonally, such as summer day camps; these day camps operate on week-long, age-appropriate themes with opportunities for campers to see and learn about the animals on-site and experience exclusive ‘behind-the-scenes’ occasions to meet keepers and encounter animals up close. Facilities like the Toronto Zoo offer an overnight opportunity for Discoverers and BioCamp (ages 11-16) to sleepover outdoors in the African Savanna area in the middle of their Zoo Camp week. The Serengeti Bush Camp overnight experience is also offered to members of the public during the summer months as well. When spring and summer camps are not running, family programs, adult and youth programs are offered as overnight and day programs depending on the nature of the content. Other on-site programs for families and children to learn about wildlife in zoos or aquariums are youth badge workshops for children in Scouts and Guides groups. The zoo education staff is trained to lead guided tours and themed activities to cover numerous badge requirements. Formal school-related

curriculum-based programs are also available for students and teachers. Programs range from elementary (junior kindergarten to grade 8), secondary (grade 9 to 12) and post-secondary levels.

Certificate courses are also offered in a number of subjects, some of which can be earned online. For example, Taronga Zoo in Sydney, Australia offers on-site courses in photography, animal studies, and tourism while the Vancouver Aquarium offers archived lectures and an archived marine life course available online, which originally took place in the fall of 2014 (2015). There are countless opportunities for learning at zoos and aquariums.

Animals in zoos “are a great stimulus for cross-curricular education” and programs facilitated by staff incorporate visual, auditory and kinesthetic learning opportunities (Whitehead, 1995, p. 666). At large accredited zoos facilitators are often chosen on the basis of their professional and educational background and for their communication skills and ability to offer engaging and up-to-date information. Thus, regarding conservation education programming, “the potential is there to take people from awareness to action” and create memorable outcomes (Whitehead, 1995, p. 666).

These conservation education activities are often facilitated by volunteers and docents (volunteer teachers) who assist department staff. Volunteers at zoos and aquariums complement education staff by “providing an exciting and educational experience” for visitors (Association of Zoos and Aquariums, 2014). Volunteers and docents give their time and energy to “interpret exhibits, lead educational programs, help maintain [zoo] grounds and exhibits, work special events [on-site and off-site] or assist with the care of the animals” (Association of Zoos and Aquariums, 2014). In addition, many zoos offer a student volunteer program in which secondary school students are offered opportunities to assist the zoo and aquarium on-site. Depending on the institution, students have opportunities to work with animals and the public. Staff or adult

volunteers and docents supervise the positions and give the students experience in working directly with the public.

An interpretative station is one unique informal learning tool that is utilized by both adult and student volunteers to engage the public about endangered species conservation (Kusiak, personal observation; 2012). According to the Toronto Zoo's Conservation and Education Activities Report 2011-2012, the Volunteer-led interpretive touch tables attracted nearly 600,000 visitors in 2011 and provided the public with opportunities to actively examine biofacts (pelts, skulls, feathers, etc.) (2013). Interpretive stations can be particularly effective for children and visitors with disabilities who are tactile learners. The chance to touch a polar bear claw and learn about Arctic adaptations and conservation at the same time as being able to view the animal can provide a visitor with a positive engaging experience and encourage visitors to live harmoniously with nature (Kusiak, personal observation; 2012). Volunteering at accredited zoos gives participants a chance to promote wildlife conservation by educating the public about animals and conservation with specific training for response strategies and learning to facilitate effective discussions.

To further efforts for species conservation and preservation of habitat, zoos have partnerships working with external organizations on multi-level governance. These partnerships operate between accredited zoos and aquariums, Federal, Provincial and national agencies, and non-governmental organizations. Collaborations in the preservation of biodiversity through endangered species programs have become a growing trend over the last three decades (Clark & Brunner, 2002). Progressive zoos and aquariums can act as modern arks, in which animal populations are "carefully managed" until such as time as they can be safely re-established back into the wild (World Association of Zoos and Aquariums, 2005). The World Zoo and Aquarium

Conservation Strategy (WZACS) encourages *in situ* conservation, crucial for species preservation, through direct fieldwork efforts or indirectly such as fundraising (Hosey et al., 2013; World Association of Zoos and Aquariums, 2005). While reintroduction projects have been achieved with notable successes, such as the black-footed ferret and red wolf, reintroductions are not routine in conservation practice as they involve and require “long-term support in research, time, dedication and money” (Stanley Price and Fa, 2007; World Association of Zoos and Aquariums, 2005).

A suggestion by WZACS for zoos and aquariums is to implement integrated conservation, which seeks to achieve conservation goals through the collaboration of different agencies and their respective activities towards conservation initiatives (World Association of Zoos and Aquariums, 2005). Integrated conservation incorporates ‘internal’ and ‘external’ approaches for the management of endangered species (World Association of Zoos and Aquariums, 2005). Internal integrated conservation includes “keeping animals and providing an enjoyable and informative visitor experience, but it is also about making links between the various activities that contribute to these” (Hosey et al., 2013; World Association of Zoos and Aquariums, 2005). Examples of how zoos could establish these links include: highlighting on-site sustainability initiatives, selling crafts from areas with connections to the zoo’s field conservation and informing visitors about the connections between the exhibits and the conservation research the zoo is involved in (World Association of Zoos and Aquariums, 2005). External integrated conservation emphasizes collaborations with multiple stakeholders to promote and support field research and conservation efforts on wild populations, and fundraise money for *in situ* conservation (World Association of Zoos and Aquariums, 2005). No singular zoo can be expected to do all that is involved in integrated conservation; however, efforts are being put into

practice by zoos and aquariums to continue reaching their conservation mandates. The Center for Ocean Solutions is a working example of integrated conservation. It was founded in 2008 by the Monterey Bay Aquarium in California, along with Stanford University and the Monterey Bay Aquarium Research Institute. This organization collaborates to link marine science and policy to discover innovative solutions to solve the world's major ocean problems (Center for Ocean Solutions, 2015).

Promotional work is another technique that zoos can use to bring conservation issues to the forefront of the public's attention. This includes "public relations activity, the internet and advertising" (World Association of Zoos and Aquariums, 2005, p. 12). However, in recent years promotional work has shifted drastically into the digital age, with the Internet dominating worldwide communications.

3.2.1 The Role of Information Technology in Conservation Education

The Internet, and more specifically, social media, can be used as communication tools for "increasing awareness and building consensus on conservation issues" (World Association of Zoos and Aquariums, 2005, p. 13). While WZACS encourages zoos and aquariums to utilize a diversity of communication tools within available resource limits (e.g., radio, newspapers, etc.) the Internet offers zoos opportunities to circulate their conservation message on a global scale (2005). Not only does the Internet provide zoos and aquariums a means of reaching the public, but it also allows other accredited zoos opportunities to work together online to "share techniques and resources relatively cheaply and even to use Internet technology for specific educational activities such as training" (World Association of Zoos and Aquariums, 2005).

Zoos attempt to use social media websites to raise awareness of and educate the public about conservation issues. Whether or not they have been successful in achieving this outcome has yet to be determined. Social media allows zoos to keep the public up-to-date on what is being achieved. An official YouTube channel is one social media platform that makes it possible for the public to view behind-the-scenes animal encounters at zoos and aquariums. This form of online engagement puts the filming and editing power in the hands of the zoo while providing transparency for the videos to be distributed to the media. Twitter and blog posts can provide zoos and aquariums opportunities to share information on current research, conservation and education actions happening on-site. Twitter also gives followers access to view related posts on a topic via hashtags and to see who the zoo or aquarium follows.

Facebook is a social media site that combines multiple communication options from exchanging messages to sharing videos and photos. According to Facebook's company information as of December 31, 2014, 1.39 billion people are active users globally (Facebook, 2015). Given this staggering statistic, accredited zoos and aquariums have the potential to effectively use this site to develop networks, generate interaction, and contribute information to the public.

For this research project, the official Facebook pages of the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium are evaluated for potential impact on learning outcomes that would lead to visitor behavioural changes towards a conservation ethic.

3.2.2 The Role of Citizen Science in Fostering Environmental Education

Citizen science is an alternative method in transitioning zoos toward social and ecological sustainability. A citizen scientist can be defined as "a volunteer who collects and/or processes

data as part of a scientific enquiry” (Silvertown, 2009, p. 467). Citizen science projects are growing in the ecological and other environmental sciences with projects ranging from water quality monitoring to population ecology (Silvertown, 2009). Zoos are now accepting the assistance of non-professional scientists as participants for ongoing projects associated with professional scientists and scientific institutions. Participation in monitoring the local environment through citizen science groups encourages positive results from environmental stewardship, “citizen empowerment and the production of useful data” (Savan, Morgan & Gore, 2003, p. 565).

A typical example are BioBlitz projects where experts and the general public work together to map and inventory as many species as they can in one location over one or two days of intense activity (Silvertown, 2009, p. 467). The Toronto Zoo hosted the inaugural Ontario BioBlitz - Rouge Park BioBlitz in Ontario in 2012 and partnered with the Toronto and Region Conservation Authority, the Royal Ontario Museum, the Rouge Park Alliance, Rouge Park Conservation Center, and the Ontario Nature (2014). This endeavour proved to be the largest survey of its kind in Canadian history attracting over 225 participants identifying over 1,450 different species within the park (Toronto Zoo, 2014). This project, which was conducted over a 24-hour collection period merged specialists and the public to document the biodiversity within the region while providing a “venue for public education about biodiversity and conservation” (Toronto Zoo, 2014, p. 13).

The above examples illustrate the different ways in which zoos are attempting to create authentic learning experiences for visitors in order to foster a conservation ethic and practice. Using the criteria elaborated above in Section 3.2, programs of zoos and aquariums at three Canadian accredited facilities are evaluated. The objective is to determine if these institutions are

meeting their goals in ongoing developments toward conservation education and awareness. The initiatives implemented by accredited zoos range from on-site environmental education opportunities to the integration of social media platforms are collective attempts to communicate to the public their committed conservation efforts. It seems zoos are moving towards authentic learning, but are they successful?

3.3 Can Deep Learning Advance the Conservation Message?

Zoos employ various approaches to reinforce authentic learning towards conservation. Less clear, however, is the effectiveness of these efforts in achieving their goals. It is worthwhile, therefore, to include the following discussion about what accredited zoos and aquariums are doing and how they are hoping their efforts will educate people to foster conservation. As noted from the examples in Chapter Two and Section 3.3 of this chapter, zoos and aquariums “are evolving from museum-like repositories to interactively managed sanctuaries with increasing links to the field” (Whitehead, 1995, p. 664). In practice, multiple contributions have been made, and are continuously being made by these institutions towards biodiversity conservation. The primary research in this thesis will explore whether or not they are being effective towards transformational thinking in visitors.

Part of the three-year study conducted by Falk et al. on the educational impact of AZA zoos and aquariums explored public motivations for visiting. Previous research conducted by Falk and Storck investigated the motivations people have for visiting these types of “free-choice” learning institutions, which emerge as identity-related (2005; Falk et al., 2007). Much like Gardner’s theory of multiple intelligences, visitors to zoos could theoretically possess a number of identity-related motivations as opposed to being bound by a singular motivation (Falk

et al., 2007). That said, Falk recommends classifying the identity-related motivations into five categories:

1. *Explorers* – are curiosity-driven and seek to learn more about whatever they might encounter at the zoo.
2. *Facilitators* – are primarily focused on enabling the experience and learning of others in their accompanying social group.
3. *Professional/Hobbyist* – feel a close tie to the zoo’s content and their professional or hobbyist passions.
4. *Experience Seekers* – primarily derive satisfaction from the fact of visiting the zoo as an important site attraction.
5. *Spiritual Pilgrims/Rechargers* – are primarily seeking a contemplative and/or restorative experience at the zoo. (2006; Falk et al., 2007)

Falk has asserted that identity-related motivation encompasses numerous relevance entering visitor variables such as personal knowledge, personal interest, visitor agenda, social group, and past experiences (Falk 2006; Falk et al., 2007). After surveying visitors from four AZA accredited zoos and four AZA accredited aquariums in North America, all five identity-related motivations were represented in the study sample; Explorers and Facilitators were the two primary identity-related motivations (Falk et al., 2007). Grouping visitors into identity-related motivation categories provided insight into on-site behaviours of visitors, as well as the short and long-term outcomes of their visit (Falk et al., 2007).

3.4 Summary

To assess whether zoos are successful in implementing their educational mandates, we need to know something about the motivations of a zoo visitor. Falk offers a useful framework, which categorizes visitor types. This framework is applied to the social media analysis and the case

study component of this thesis. While Falk has identified visitor types, the available literature does not reveal much information regarding what the public actually learns relating to conservation messages. It is clear that there is a need to have a sense of whether these programs, that require significant financial resources to execute, are having an impact. The purpose of this thesis is to fill this gap. The following chapter will detail the research design and the methods used to gather the primary and secondary research.

4.0 Into the Zoos: Overview of Research Methodology

The data upon which this thesis is based was obtained from both secondary and primary sources. The conceptualization of the thesis is approached with a focus on experiential learning explored within accredited zoos. To briefly recap, first, a literature review (Chapter Two and Three) was conducted in order to review what was meant by the changing mandates of accredited zoos and whether their environmental education program conservation messages effectively reach the public. The secondary review of the literature reveals some important insights into the definition and characteristics of authentic learning experience and how it is used for the purposes of this thesis. As well, the literature offers some insight into what various zoos are doing with respect to authentic learning experiences and identifies that there are different zoo and aquarium visitors who are motivated to visit for different reasons. However, zoo and aquarium visitor literature does not provide us an assessment as to whether all these efforts actually make an impact on behaviour towards conservation. Therefore it is necessary to undertake primary research to explore that topic.

The secondary literature, which has been used to determine criteria that might indicate when deep and authentic learning has taken place is used in this thesis to assess whether in fact these educational programs make a difference in behaviour on the zoo visitor. In order to assess this, a variety of methods are employed. A case study analysis of three zoos draws on semi-structured interviews conducted with zoological facility volunteers. Second, a social media site analysis is explored to see if there was evidence of deep learning. Third, personal observation in the case of the Toronto Zoo plays a role in the primary research. This research is also informed by a semi-structured interview with a wildlife biologist who has extensive experience in

examining charismatic species in the wild and also has considered the role of zoos with respect to their conservation efforts.

4.1 Primary Research: Multiple Case Study

This thesis incorporates three case studies designed to examine and provide insight into the environmental education programs of accredited Canadian zoos. A case study is appropriate as a method that is exploratory, descriptive, or explanatory regarding the question being researched (Yin, 2003). The three case studies included in this thesis are the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium. They were chosen to evaluate the effectiveness of their environmental education programs in efforts to inform the public about their conservation mandate to protect endangered species. The choice to focus on the three accredited zoos is to represent progressive organizations with concentrated efforts towards endangered species protection and raising awareness through public programming. Additionally, all three case studies are Canadian, accredited and comparative in their location to a major city center.

For the purposes of this research, Robert Yin's popular 'case study protocol' was employed as identified in *Case Study Research: Design and Methods* (2003). The protocol is comprised of five components, the first being the formulation of the research question investing a 'how' or 'why' as noted in the first chapter and above (Yin, 2003). The second component advises that the researcher states some propositions (Yin, 2003). A primary proposition of this thesis is that zoos are attempting to serve as places of protection and conservation in biodiversity, through experiential education. Whether or not they do so in practice deserves investigation. The third component of the protocol is to identify the units of analysis, which in this study includes the volunteers of each zoological institution and the zoos and aquariums' associated Facebook

pages. The fourth component requires the logical linking of data to the propositions. In the case of this thesis, it refers to whether or not zoos deliver reputable environmental education programs aimed at reaching a public audience for conservation purposes. The last component requires the provision of criteria for interpreting the study findings. Ascertaining the success of demonstrated effectiveness of the education programs towards conservation will be achieved through analyzing the volunteer responses to questions about environmental education.

4.2 Semi-structured Interviews of Zoological Institution Volunteers

Semi-structured interviews were conducted with participants associated with each zoo. Zoo volunteers were chosen for interviews because of their educational position at the zoos, and willingness to volunteer their time as educational resources to visitors in formal and informal learning settings. These volunteers have been most exposed to the environmental education programs offered by the zoos as they are often involved in leading these programs and educate the zoo visitors taking part. Of all the parks visitors, it is reasonable to assume that if these programs effectively encourage conservation behaviours, they are most likely to have had an effect on repeat zoo visitors, namely the zoo volunteers. Given this position, volunteers offer insight into their roles first as visitors and learners and, later as educators regarding their personal experiences of the zoo. They were also asked if the zoo influences the way that they behave or take action with respect to conservation. Finally, their opinions were asked on the impact these programs might have more widely on the other visitors. Table 4.1 shows how many volunteers were interviewed for each case study. In each case study, hundreds of volunteers contribute their time to the zoos in question.

For the purpose of this study, I, as the researcher, liaised with each facility's Volunteer Coordinator who served as the gatekeeper and who communicated with the volunteers about participating in the study on my behalf. The gatekeeper provided volunteers with an information letter regarding the purpose of the study with contact information for the researcher. The letter was circulated via email leading to individuals volunteering to participate in the study; this allowed the researcher to arrange interviews with interested participants.

Zoological Institution	Number of volunteers interviewed
Calgary Zoo	6
Toronto Zoo	16
Vancouver Aquarium	8

Table 4.1: Number of Interviewees for Each Zoological Institution

The interviews ranged in length from 20 minutes to two hours and consisted of both closed and open-ended questions. An interview approach was selected as a method of data collection to allow for narratives and a thorough investigation of the behavioural effects zoos have on volunteers and visitors. Opportunities for follow-up questions were available with interviews. In addition, clarification could be provided, if and when necessary. Bryman, Bell and Teevan, suggest that semi-structured interviews offer research participants flexibility when deciding how to reply without steering them towards a particular answer (2012). Through the use of semi-structured interviews, specific topics were consistently touched upon in this research project. The open-ended questions generated narratives, which offered interviewees opportunities to share stories relating to their zoo volunteer experience and other activities pertaining to environmental and conservation education. This methodological approach provided deeper insights into the impact of the conservation education programs (Bryman, Bell & Teevan,

2012). This methodological approach also extracted information from these narratives, connecting people's accounts of events and the sense and significance they attribute to those connections (Bryman, Bell & Teevan, 2012). A thematic analysis was used to explore the content of what the interviewees said rather than the manner in which it was said (Bryman, Bell & Teevan, 2012). In contrast to the open-ended questions, which allowed participants to respond and interpret questions in their own way, the closed-ended questions provided specific information such as age demographics to determine any parallels between such things as age and conservation awareness. All participants involved were over 18 years of age.

As noted above, volunteers were recruited through the mediation of gatekeepers. Gatekeepers are a vital component for research access (Punch, 1994). The gatekeepers involved in this study were the volunteer coordinators of each respective zoo and were chosen as the most appropriate communication source in connection to the volunteers. The volunteer coordinators associated with each zoo were first contacted to receive approval for interviewing volunteers. Pending approval, the gatekeeper distributed my information letter detailing the purpose of my study and the need for volunteer perspectives on animal conservation and environmental education. Those interested then contacted me, the researcher, directly. Interviews involving the Toronto Zoo participants were conducted either in-person, via telephone, or Skype. The Calgary Zoo and the Vancouver Aquarium interviews were conducted strictly via telephone or Skype due to geographical restrictions. This information provided an interesting insight into how visitors perceived zoos via their engagement with social media.

4.3 Social Media Analysis

In addition to the interviews, a social media analysis of the three case studies' official Facebook pages is conducted. Facebook was chosen for its popularity as a social media site utilized by people in a range of demographics such as age and user accessibility. The collection of data occurred from May 1, 2013 to October 31, 2013. While the summertime reflects the peak visitor months of each zoo, I included an extra month to make sure I was capturing the entire season. 2560 screenshots were collected. As noted in Chapter One, the screenshots were saved as a PDF to remove the possibility for alterations to the data (Altheide & Schneider, 2013). The data analyzed consists of comments from the Facebook pages of the zoos to determine what type of individual visits the zoo or aquarium and whether or not their responses are indicative of a learning outcome. Through inductive analysis, the data is evaluated to determine if the Facebook pages of the zoos are useful resources for evaluating learning outcomes and determining visitor-type motivations.

4.4 Personal Observation

Another primary method included my role as the researcher in the role of a participant observer for the Toronto Zoo case study. The personal observations do not follow a formal methodological approach. The observations came from my time observing visitors, but I have not conducted any systematic approach to personal observation for the purposes of this thesis. Bryman et al. suggest that personal observation can play an important role in social research where the researcher is the main instrument for monitoring and collecting data (Bryman, Bell & Teevan, 2012). When using participant observation, data collection can be covert or overt and participation and involvement in participants' lives can vary (Bryman, Bell & Teevan, 2012).

The potential value to research that this approach offers is the opportunity for an ‘insider’ viewpoint and the information may be much more genuine with less reactivity from participants (Bryman, Bell & Teevan, 2012). In covert research, participants are unaware that they are being observed “and will speak more naturally than they would otherwise” (Bryman, Bell & Teevan, 2012, p. 150). I, as the researcher have eight years of summer experience in this role through my employment with the Toronto Zoo. Participant observation assisted me in understanding how the different types of programs relate to authentic learning, and the impacts they have along with what appears to work well and what does not.

4.5 Expert Interview

Finally, to gather an opinion on animal conservation from someone that has an external (to the zoo) understanding of wildlife conservation a wildlife biologist was recruited for an interview in order to investigate her perspectives about the conservation value of zoos’ educational programs. Zoologist Dr. Anne Dagg of the University of Waterloo was contacted to offer her insights into animal conservation and the role of zoos. The interview was conducted in-person and followed the same format as that of the zoo volunteers. That is, the interview was comprised of closed and open-ended questions with the opportunity for personal narratives to be included in the conversation.

4.6 Limitations

The methodology of this thesis has minimal limitations with respect to effectively investigating the research question, but these limitations were all managed appropriately. A problem with the

case study design involving a comparison of multiple cases is that in order to compare results across all case studies, the researcher must choose explicit focuses for the research from the outset. This could cause a narrow view of each case because the researcher focuses only on certain aspects of each case, not necessarily on the whole picture of each case (Bryman, Bell & Teevan, 2012). However, the research in this thesis is primarily qualitative in nature, focusing on contextual insight and less structured research approaches. This allows the researcher to evaluate many different aspects of each case, and does not rely as heavily on specific focuses decided upon from the outset (Bryman, Bell & Teevan, 2012).

In addition, the case study design is often challenged for its failure to guarantee generalizability (Bryman, Bell & Teevan, 2012). Case studies of accredited Canadian zoos cannot be indicative of all other Canadian or North American accredited zoos. Despite universal standards upheld among all accredited zoos, this study was not intended to create generalizations. Time constraints restricted the researcher from including other accredited zoos within North America. The inclusion of other zoos would reveal more information and insights into the effectiveness of their environmental education programs and their ability to reach different visitor-types. Regarding the use of semi-structured interviews, ‘interview effects’ may have arisen from the interviewee noticing how the researcher responds to answers (Bryman, Bell & Teevan, 2012). The interview effect is when the interviewer manipulates the responses of the interviewee whether intentionally or unintentionally (Bryman, Bell & Teevan, 2012). This can be caused by vocal inflections, body language, prior knowledge of the interviewer/interviewee, etc. (Bryman, Bell & Teevan, 2012). To account for this, the researcher was professional and stressed that any response to the questions was acceptable (Bryman, Bell & Teevan, 2012, p. 66). No

personal information about the interviewer was shared with the participants prior to the conclusion of the interview.

Another limitation of the research methods chosen is confirmation bias. Confirmation bias refers to recalling information or interpreting evidence when it confirms ones existing beliefs or hypotheses (Nickerson, 1998). From an interpretist point of view, the individual qualities of the human inquirer are indispensable when constructing meaning from a body of qualitative work (Greene, 1994). This research might be criticized for confirmation bias in the volunteer samples. Even those who volunteer at a zoo that is heavily involved in conservation initiatives do not necessarily act in accordance with what those initiatives suggest. For instance a volunteer at a zoo that is facilitating recycling awareness programs does not necessarily recycle as much as the initiative would suggest. I took care to look for confirmation bias because, in certain circumstances, people are attracted to volunteering at a zoo in the first place because they are already conservationists or have an established conservation ethic. The control for this bias was to look for specific instances where a volunteer at a zoo took additional actions towards conservation as a result of learning from, and participating in, the zoo's educational programs.

Additionally, the participant observation component of the research could be biased with respect to how I, interpret the information. I could have been subconsciously selective in filtering information to validate my biases given my own knowledge of zoos. Through participant observation at the Toronto Zoo, I was not able to come to a deep understanding of the conservation ethics and learning outcome of on-site visitors. However, the value of participant observation is that it provides potential opportunities for understanding interactions as they are occurring but reduces the risk of subject reactivity (Bryman et al., 2012). In addition, by only observing one of the three case studies, a comparison of visitor experience cannot be made

across zoos. However, participant observations made support the findings from other avenues of research, and provide unique perspectives on conservation learning at the Toronto Zoo.

All that said, given the anonymity of the interviewees involved in the study, there is little reason for the participants to alter or censor their communication or behaviour around the researcher, although they might have done so for other reasons. It is worth noting that in the social media analysis section, some of the posts made by visitors were made by members of the zoo who are more aware of the conservation initiatives ongoing at the zoo in question.

4.7 Summary

For the primary research aspect of the methodology, a multiple case study design is employed to investigate the effectiveness of environmental education programs within zoos. The case studies are Canadian accredited zoos near, in geographical position, to large city centers. Several data collection sources are used to strengthen the study's validity. Within this thesis, semi-structured interviews, social media analysis, and participant observation are used to obtain primary data. The data is then compared against secondary literature to determine the effectiveness of environmental education programs within zoos and to consider whether long-term learning is occurring among its visitors, specifically the long-time visitors: namely the zoo volunteers. The following chapter explores the case studies and their findings.

5.0 Behind-The-Scenes: Overview and Description of Case Study Zoos

Canada has a number of progressive zoos that are also members of CAZA. *Accredited* Canadian zoos are required to focus on the promotion of animal welfare and provide education to the public about conservation initiatives that the institution is participating in. Non-accredited/privatized facilities may choose to promote conservation and animal welfare but are not required to. Further, accredited zoos demonstrate ways in which the public can support and contribute to environmental stewardship. As noted in previous chapters, this study focuses on three prominent zoos situated within major municipalities. Alberta's Calgary Zoo, Ontario's Toronto Zoo, and British Columbia's Vancouver Aquarium are zoological institutions comparable in operation and reputation. The following case study overview provides a brief history of each zoo, its layout, and many of its current environmental education programs. The examples highlight the breadth of many of their inter-related environmental education and conservation initiatives.

5.1 Calgary Zoo

Calgary Zoo, founded in 1929, is operated by The Calgary Zoological Society (Calgary Zoo, 2015). The "independent not-for-profit Society" operates the site with 707 animals representing 130 species (Calgary Zoo, 2015, para. 2). The Calgary Zoo is the city's top tourist attraction with 50 percent of its visitors coming from outside Calgary (2015). In addition to attracting tourists, the Calgary Zoo has also attracted global attention with its Centre for Conservation Research. The efforts of a team of biologists have received international recognition as leaders for North American Conservation (Association of Zoos and Aquariums, 2014). The Calgary

Zoo's Centre for Conservation Research has received AZA's 2006 and 2011 Top Honours for its efforts on conservation research on the Prairies of Canada and Montana (2006) and its work on the Vancouver Island Marmot Recovery Program (Association of Zoos and Aquariums, 2014). An example of the Centre's outreach and impact is its partnership with conservation agencies such as Montana's Fish, Wildlife and Parks (Ausband & Moehrenschrager, 2008). This collaboration has resulted in the successful reintroduction of the once extinct swift fox to Canada (southern Alberta and Saskatchewan) and to the Blackfeet Reservation in northern Montana (Ausband & Moehrenschrager, 2008). Much of the Zoo is divided into zoogeographic regions: Canadian Wilds, Destination Africa, and Eurasia. The remaining "Destinations" include the Conservatory & Gardens, the Penguin Plunge and an "animatronic dinosaur exhibit," called Prehistoric Park (Calgary Zoo, 2015). As part of the Calgary Zoo's master plan *Inspiring Change*, the Zoo focuses on "creating well-designed, naturalistic exhibits within immersive, geographic zones," building on its mission statement to "take and inspire action to sustain wildlife and wild places" (2011).

In addition to demonstrating best practices in enhancing exhibits, the Calgary Zoo is operating and promoting on-site sustainability initiatives. An example of the Calgary Zoo's sustainable environmental practice is the updated LEED (Leadership in Energy and Environmental Design) certified ENMAX Conservatory, which has been retrofitted with energy-efficient technologies (2015). Updates to the building have improved "its heat, energy and water efficiency and reduce[d] its [carbon dioxide] (CO₂) emissions" (Calgary Zoo, 2015, para. 8). Care for endangered species on and off Zoo site, continued commitment to sustainability and conservation practices, combined with engaging and inspiring change in others will allow the Calgary Zoo to fulfill its vision as "Canada's leader in wildlife conservation" (2015).

5.1.1 Current Environmental Education Programs at Calgary Zoo

The Calgary Zoo offers a range of education programs and visitor experiences to raise awareness about their conservation initiatives. Educators for these programs include: interpreters, teachers, program coordinators, summer camp leaders, and volunteers responsible for facilitating programs for “more than 575,000 people” annually (Calgary Zoo, 2015). The programs offered are geared towards both adults and children in formal and informal settings (see Table 5.1 below). A number of free daily programs are offered to visitors; for example, storytime is offered by Zoo education volunteers reading from children’s books and opportunities to see and touch animal biofacts (Calgary Zoo, 2015). Creature Feature provides visitors a chance to meet with a zookeeper and program animal up close to ask questions about them, and Keeper Talk allows visitors to hear zookeepers “share their personal animal experiences and knowledge” (Calgary Zoo, 2015). Another occasion to learn about the animals at the Zoo is the Interpretive Talks presented by the education interpreters, which include biofact displays (Calgary Zoo, 2015).

Family programs include public and private sleepovers at the Zoo with special themes throughout the year from Northern Nights Sleepover to Rainforest Adventure Sleepover (Calgary Zoo, 2015). Spring and summer camp programs are available for children, ages four to fourteen with opportunities for zoo-related art camp to biologist and zookeeper camp (Calgary Zoo, 2015). Preschool programs with different themes are available for children to come to the Zoo to experience “learning through nature, music, games and stories” (Calgary Zoo, 2015).

Formal Education	Indirect Education
Discovery Programs, Grade K - 3: school program	Spring & Summer Camps
Ed-Venture Programs, Grade 4 - 10: school program	Birthday Parties: themed and lead by education staff
Wild Inquiries, Grade K - 12: school program	Touchables: animal artifacts display

Zoo for a Day Programs, Grade 7 - 12: school program	Creature Feature: animal encounter
Home School Days, preschool – Grade 9	Animal Behind-The-Scenes
Self-Guided Tours: teacher/educator led	Eco-Cell: cell phone recycling program
Chevron Zoo School: on-site curriculum based	Zoo Tours
Grounds for Change: native plant/food garden program	Keeper Talk: presentation
Little Green Thumbs: indoor gardening	Preschool programs
	Scouts and Guides programs
	Sleepovers: private and public group overnights
	Interpreter Talk: presentation
	Botanical and Landscaping Courses
	Drawing and Photography
	Seasonal Courses: e.g. learn to make natural summer products
	“WILD LIFE”: online member magazine

Table 5.1: Calgary Zoo Formal and Indirect Education Programs and Initiatives

Scouts and guides groups have a chance to go to the Calgary Zoo for youth guided tours (2015).

Adult courses in gardening and landscaping are available for individuals wanting to learn plant and tree identification skills, landscape design, and master garden certifications (Calgary Zoo, 2015).

In addition to visitor programs, occasions for formal learning are offered through school programs at the Calgary Zoo. Curriculum-based programs are available for students in kindergarten to Biology 30 (grade 12 equivalent). These programs are “the perfect way to stimulate curiosity and demonstrate the practical applications of curriculum topics” (Calgary Zoo, 2015, para. 1). Specially designed programs are offered for home school students as well as self-guided tours for school groups. Chevron Zoo School is a weeklong learning session for teachers to bring their classroom to the Zoo. A program is planned out with the zoo school coordinator to integrate “the week into [the teacher’s] yearlong teaching plan” and is offered for all grade levels (Calgary Zoo, 2015). Another program designed for students is the Grounds for Change program, which was developed to assist schools in effectively “transforming sections of schoolyards into

native plant and/or food gardens” (Calgary Zoo, 2015). Along with Grounds for Change, Calgary Zoo is involved in the Little Green Thumbs indoor gardening program for the classroom and provides resources including materials, training and support along with numerous school visits (2015).

The Zoo also engages in conservation outreach initiatives to raise awareness and incite action among those involved locally and globally. For example, between 2007 and 2012 Calgary Zoo visitors “recycled approximately 21,000 cell phones, raising almost \$21,000 towards helping primates, including apes, in the wild” (2015, para. 9).

Calgary Zoo’s volunteers are involved in facilitating many of the educational programs. Opportunities to become a volunteer are available for adults and for children between fourteen and seventeen years of age, there is a Junior Zoo Guide program. While the youth volunteer programs allow students to participate in special events and assist summer camp staff with activities, it is the adult volunteers who are more actively involved in an educational role with the Zoo. Volunteers participate in both formal and informal education programs to interact with the public. Some individuals at the Calgary Zoo have received more training than others and are known as docents, however, all are volunteers. The training program, which is available to all Calgary Zoo volunteers, is a combination of in class and online training, focusing on natural history. While in the past this training was only open to a pre-selected group of volunteers, it is now offered to all volunteers.

Current events and conservation efforts are presented to the public through the social media pages including their YouTube, Facebook, and Twitter pages. Many of these messages and images show behind-the-scenes details of animals with zookeepers, wildlife care staff, and field researchers. These social media platforms allow the Calgary Zoo to highlight outreach

efforts including citizen science projects and events for the public to participate in. For instance, the Map of Life “web-based software program” was designed with zoo researchers and biologists in collaboration with the Calgary Zoo’s Centre for Conservation Research, Yale University, and the University of Colorado Boulder (Calgary Zoo, 2012, para. 1). This technology allows “scientists and ordinary citizens alike” to document, map and find species by location on the planet (Calgary Zoo, 2012, para. 3). Jetz and colleagues from the University of Colorado Boulder and the Calgary Zoological Society describe their vision for the curated, Wiki-mapping tool in a recent paper in the journal *Trends in Ecology & Evolution* (2012). The hope for the Map of Life project is to “both empower and entice the community to actively participate in creating the best possible species distributional knowledge and to recognize the major knowledge gaps that still constrain science and society” (Jetz, McPherson & Guralnick, 2012, p. 158). Social media approaches involve and inform the public about ongoing conservation education events at the Calgary Zoo and encourage visitors to connect with nature and the animals they strive to protect. As will be seen, there are many similarities in policy and education between Calgary and the Toronto Zoo.

5.2 Toronto Zoo

The Toronto Zoo first opened to the public on August 15, 1974. The Toronto Zoo is situated in the Rouge River watershed and has over 5,000 animals excluding invertebrates, representing 495 different species (2015). With over 287 hectares (710 acres) of land, the Toronto Zoo is one of the largest zoos in the world. Similar to the Calgary Zoo, the Toronto Zoo distributes its plants and animals into seven zoogeographic regions: Indo-Malaya, Africa (Savanna and Rainforest), Americas, Australasia, Eurasia Wilds, Canadian Domain, and Tundra Trek (2015). This provides

the best representation of “the broad ecological division of the earth’s animal populations” (Toronto Zoo, 2015, para. 13).

Like Calgary, Toronto Zoo embraces clean and renewable energy sources as sustainable solutions and leads by example in their practices to reduce their ecological footprint contributing to their vision as “Canada’s national leader in saving wildlife to ensure the rich diversity of nature for future generations” (2015). Continued efforts have been made since the creation of the Green Plan 2007 onwards (Toronto Zoo, 2012). The installation of solar thermal panels on the Toronto Zoo’s Administrative Support Centre has reduced CO₂ by “40 tonnes per year and natural gas use by 50 [percent]” (2012, p. 36). The goal of this particular project is to offset a third of the Toronto Zoo electricity needs” (2012, p. 46). Continued initiatives such as the solar projects support the Toronto Zoo’s mandate as “a living centre for education and science, committed to providing compelling guest experiences and inspiring passion to protect wildlife and habitats” (2015). This mandate informs and stresses the importance of environmental education programs at the Toronto Zoo.

5.2.1 Current Environmental Education Programs at Toronto Zoo

Moving towards the fulfillment of the Toronto Zoo’s mandate as a centre for education and science, the zoo provides many environmental education programs (see Table 5.2 below). The Toronto Zoo participates in both formal and non-formal education projects much like the Calgary Zoo. Examples of Toronto Zoo formal education projects include student and teacher workshops, and internship projects, as well as offering resources for teachers/educators (2014). Curriculum-based programs are available for elementary, secondary, and post-secondary levels. Resources for educators planning a field trip are also available with proceeds from school visits

going to the support of Zoo operations, which include conservation and education initiatives (2015). Operation Conservation is a grant funded, community-based program offered for “at-risk” youth, which inspires children to take environmental action and “contribute positively to their communities and school” (2015). Another example of education that is making an impact on education in collaboration with the Toronto Zoo is the conservation partnership with Earth Rangers. The organization “provides children with the opportunity to protect animals, to improve the environment and to make a difference” (Earth Rangers, 2015). Earth Rangers in partnership with the Toronto Zoo started its Bring Back the Wild campaign for Blanding’s turtle (2014). While providing education for children and their families on the status of turtles in Ontario, the campaign assists with the Zoo’s head-starting conservation project in the breeding and eventual release of these endangered turtles (Earth Rangers, 2014).

Like the Calgary Zoo, the Toronto Zoo offers a Zoo School program. The programs differ in the Toronto Zoo’s registration with the Ministry of Education to serve as a private school for students to earn their grade 11 biology, university preparation (SB13U) credit (2014). Students have an opportunity to engage in interactive on-site learning during a four-week summer program offered in both July and August (2014).

Formal Education	Indirect Education
Elementary school programs, Grade K - 8	Animal Outreach TM : off-site interactive presentation with a Zoo Keeper and animal encounter
Secondary school programs, Grade 9 - 12	Serengeti Bush Camp: overnight program
Self-Guided Tours: teacher/educator led	Zoo Camp: summer camp
Guided Tours: volunteer led guided tour and discussion, curriculum-based	
Zoo School, Grade 11	Panda Pyjama Party: overnight program
Zoo to You Program, Grade K – 12: classroom presentation	Youth Badge Programs: available for Guides, Brownies, Sparks, Scouts, and Cubs
Aqua-Links Program, Grade 7: Atlantic salmon recovery program/water conservation	Weekend Children’s Programs, ages 4-14
Great Lakes Program, Grade 1, 2, 7 & 11: water and local fish species conservation	Parent and Tot, ages 2-4 with an adult: program supervised by education staff

presentation	
Teacher and Student Online Resources: activities, assignments, and lesson plans	Meet-the-Keeper Talks: presentation
	Interpretive Touch Tables: animal artifacts display
	Amazing: animal presentation
	Casual Encounters: animal encounter
	Adopt-A-Pond Wetland Conservation Programme: <ul style="list-style-type: none"> • Ontario Turtle Tally: citizen science program • Frogwatch Ontario: citizen science program • Urban Turtle Initiative: urban wetland stewardship program • Wetland Guardians Registry: wetland stewardship program • Healthy Water – Healthy Wildlife: Ontario lakes stewardship program • Turtle Island Conservation: First Nation stewardship program
	PhoneApes: cell phone recycling program
	Black-footed ferret and Vancouver Island Marmot Educational Outreach
	The Canadian Organization for Tropical Education and Rainforest Conservation (COTERC)
	Ontario Mussels: citizen science program
	Redside Dace- Conservation and Community Involvement: community-based fish rehabilitation projects
	International Migratory Bird Day
	ECOexecutives: sustainability workshops for businesses
	Rouge Park BioBlitz: citizen science program
	Venomous and Dangerous Reptile Training Workshops
	Fish Rescue: unwanted aquaria relocation program
	Sustainable Seafood and Shark Conservation: sustainable seafood and shark awareness collaborating with academic and environmental clubs
	“Wild For Life:” member and on-site purchasable magazine

Table 5.2: Toronto Zoo Formal and Indirect Education Programs and Initiatives

If educators do not wish to bring their classroom to the Zoo, the Zoo to You program is available from kindergarten to grade 12 with options for a live animal visitor to accompany the program (2015). This volunteer-led program includes activities, discussions, and biofacts connected to the chosen theme (2015).

As “a global think tank and postgraduate teaching organization,” the United Nations University (UNU) collaborates with “leading universities and research institutes in UN Member States, functioning as a bridge between the international academic community and the United Nations system” (United Nations University, 2015). UNU specifically cited the Toronto Zoo’s education programmes, recognizing “changes in the Provincial curriculum and the closing of outdoor education centres, places the Zoo as an attractive alternative to providing teachers and students with hands on learning approaches to science as well as outdoor experiences” (United Nations University, 2005, p. 63). The Toronto Zoo is planning the development of a Learning Centre to “establish a much-needed coordinated approach to conservation messages throughout the Zoo and provide formal professional development for staff and volunteers (United Nations University, 2005, p. 63).

Non-formal educational programs include themed family and children’s programs, youth badge programs for Scouts and Guides, Zoo Camp and Serengeti Bush Camp. The Serengeti Bush Camp is an overnight opportunity offered as a family and group program during the summer months for guests to sleep in tents within the African Savanna region of the Zoo. When this program is not in effect, another opportunity to sleepover at the Zoo is offered through the Panda Pyjama Party, allowing participants a chance to view the panda bears when the Zoo is closed to the public.

Informal education activities at the Toronto Zoo “take place in unstructured learning situations” (2014, p. 12). These opportunities include interacting with a volunteer, engaging in interpretive displays on-site such as the Kids Zoo, attending a demonstration such as the Amazing Animal Adaptations Show, listening to a Meet-the-Keeper talk, or meeting an animal at the Casual Encounters program (2014). Recognizing the need for community involvement at the local level to foster environmental stewardship among citizens, outreach opportunities and conservation initiatives are available. Toronto Zoo Animal Outreach is available year-round for off-site community, corporate functions, or private events involving a number of animal visitors accompanied by a keeper with opportunities for those participating to learn about the visiting animals and to experience them up close (2015). Another example of community outreach is the Toronto Zoo’s eastern massasauga rattlesnake conservation and education program. The Zoo offers workshops intended for people who have frequent contact with the rattlesnakes (Johnson, 1993). Seminars topics include information on snake biology, how to avoid snakebite, treating snakebite, what venoms do, the effectiveness of antivenom, etc. (Johnson, 1993, p. 90). The program’s goal of “no net loss of habitat and no further population decline ultimately depends on the support of those who live with the rattlesnake” (Johnson, 1993, p. 90). The Toronto Zoo is also involved in many outreach programs to encourage positive environmental action.

Two programs directly involved with conservation initiatives for outreach programming is the Aqua-Links and Great Lakes Programs, and Adopt-A-Pond Wetland Conservation Programme. Both conservation programs work on a local and global level through habitat restoration projects and breeding programs. Aqua-Links provides grade 7 students “a hands-on experience raising Atlantic salmon, a locally endangered fish species, in the classroom...” (Toronto Zoo, 2015, para. 1). This bilingual staff-led program encourages students to make

connections with “students and biologists in Uganda to discuss water conservation” to inform students about both local and international water issues (Toronto Zoo, 2015, para. 1). Once the Atlantic salmon fry have been raised the students participate in their release into local waterways. Students at Emily Carr Public School in Toronto participating in the Aqua-Links Program released 50 endangered salmon into the wild at the Greenwood Conservation Area in 2014 (Canadian Broadcasting Corporation, 2014). Conversely, the students in Uganda “raise and release brightly coloured haplochromine cichlids or East African cichlids” (Canadian Broadcasting Corporation, 2014, para. 3). The Great Lakes Program, like Aqua-Links, is offered in English and French to students for grades 1, 2, 7, and 11. It is a staff-led interactive presentation with biofacts and a question and answer period with program content focused around the conservation of local fish species and the preservation and maintenance of healthy aquatic ecosystems (Toronto Zoo, 2015).

Adopt-A-Pond is a wetland conservation program, which provides community groups, educators and students opportunities and resources “to protect, restore and conserve wetland habitats and biodiversity” (Toronto Zoo, 2015, para. 1). Adopt-A-Pond programs promote “conservation opportunities in communities across Ontario, and reach audiences of all ages and background” (Ontario Environmental Directory, 2015). Two of these programs are citizen science based: FrogWatch Ontario and Ontario Turtle Tally. FrogWatch participants are encouraged to report sightings and record sounds of frogs and toads, and add them to an online database to assist with the development of species distribution maps, “which help track population dynamics throughout the province” (Toronto Zoo, 2014, p. 17). Ontario Turtle Tally operates similarly to provide vital information for conservationists about the turtle populations in Ontario. Adopt-A-Pond outreach events and presentations are also available for classrooms and

community groups, which are hosted by the Toronto Zoo volunteers and Adopt-A-Pond Programme staff (Toronto Zoo, 2014).

The conservation-education mission of the Toronto Zoo is to “engage communities by providing the tools and knowledge to connect to nature and protect our natural world” (2014, p. 11). Volunteers are instrumental in carrying out this mission and involving the public. Toronto Zoo’s volunteer team includes year-round volunteers, summer volunteers, Ambassador Student volunteers, and Panda Ambassador volunteers (2014). Similar to Calgary, Toronto Zoo volunteers assist in both formal and informal education programs. Year-round volunteers have the opportunity to lead curriculum-based school tours on-site, while weekend volunteers help with special events at education stations (Toronto Zoo, 2015). Summer information volunteers are responsible for providing an interactive and engaging learning experience for visitors at the various outdoor interpretive stations as well as being involved with educating visitors about the giant pandas (Toronto Zoo, 2015). Much like the Calgary Zoo, the Toronto Zoo’s youth volunteers are involved with special on-site events and assist with weekend programs and Zoo Kids (ages four and five) day camp (Toronto Zoo, 2015). With the arrival of two giant pandas on breeding loan from China for five years beginning in 2013, a team of Panda Ambassadors is dedicated to spending time at the giant panda exhibit and interpretive centre interacting and presenting educational activities with guests (Toronto Zoo, 2015). Adult volunteers also spend time at “wayfinding stations” on-site to provide information and directional assistance to visitors (Toronto Zoo, 2015).

As with Calgary Zoo, the Toronto Zoo utilizes multiple social media platforms to function as a transparent organization. From highlighting behind-the-scenes footage of newborn polar bear cubs in the health unit to security camera footage of the giant panda – all offer insights

into otherwise restricted viewing access. Facebook and Twitter have allowed the Toronto Zoo to keep the public up to date about events and announcements including conservation initiatives on and off-site. Picture sharing sites such as Instagram and Pinterest allow for the Zoo and the public to share images related to themes surrounding conservation, biodiversity and animals on-site. While the collection of species at both the Toronto and Calgary Zoo differ greatly from the collection at the Vancouver Aquarium, all three participate in many similar environmental outreach and education programs.

5.3 Vancouver Aquarium

The Vancouver Aquarium, along with the Calgary Zoo and Toronto Zoo, is a non-profit organization, however its focus is centered on marine species. It is the largest aquarium in Canada and one of the five largest within North America (Vancouver Aquarium, 2015). The aquarium was founded as the Vancouver Public Aquarium Association in 1951 and become Canada's first official public aquarium opening on June 15, 1956 (Vancouver Aquarium, 2015). The aquarium is a 100,000 square foot (9,000 square metre) facility located in Stanley Park (Vancouver Aquarium, 2015). The Aquarium became the first aquarium to be accredited by the AZA in 1975 and first received CAZA accreditation in 1987 (Vancouver Aquarium, 2015). Similar to Calgary and Toronto, the Vancouver Aquarium provides interpretive and educational displays to provide "an informative and educational guest experience" (Vancouver Aquarium, 2015, para. 3).

Over 50,000 animals are found at the Aquarium belonging to 796 different species globally (Vancouver Aquarium, 2015). While the Aquarium specializes in curating marine and aquatic species, the Vancouver Aquarium cares for 40 different species of amphibians, 9

different species of birds, 18 different species of terrestrial invertebrates, 4 different species of non-marine mammals, and 20 different species of reptiles (Vancouver Aquarium, 2015). The facility is organized into exhibits and galleries as follows: Teck Connections & Engagement Galleries, Canada's Arctic, Tropic Zone, Graham Amazon Gallery, Penguin Point, Canaccord Financial Exploration Gallery, Treasures Of The B.C. Coast, The Wild Coast, Pacific Canada Pavilion, Frogs Forever? and Clownfish Cove (Vancouver Aquarium, 2015). The arrangement of exhibits and galleries is similar to the Calgary Zoo and Toronto Zoo's layout connecting the species to where it is found in the wild, however, Teck Connections & Engagement Galleries, and the Canaccord Financial Exploration Gallery are exceptions as they display galleries showcasing the diversity of aquatic life at the Aquarium presented non-zoogeographically (Vancouver Aquarium, 2015).

In maintaining and demonstrating accreditation standards, the Vancouver Aquarium, like the Calgary Zoo and Toronto Zoo is committed to sustainable practices on and off-site. An example of an environmentally sustainable initiative promoted and demonstrated on-site and off-site is the Vancouver Aquarium Ocean Wise conservation program. The program is aimed at promoting sustainable seafood options in restaurants, markets, and other seafood service suppliers (Ocean Wise, 2015). Understanding that overfishing is a major threat to ocean environments, Ocean Wise works directly with food service companies to select sustainable seafood, which provides assurance for consumers to make seafood choices that are ocean-friendly (Ocean Wise, 2015). This program among the many other conservation initiatives and programs in practice at the Vancouver Aquarium are indicative of the facility's commitment to its vision of "a sustainable world, where aquatic life is diverse and flourishing" (Vancouver Aquarium, 2015). As a non-profit organization, the Vancouver Aquarium is "... dedicated to

effecting the conservation of aquatic life through display, communication, public programming and education, research and direct action” (Vancouver Aquarium, 2015).

5.3.1 Current Environmental Education Programs at Vancouver Aquarium

Environmental education delivered at the Vancouver Aquarium provides the public with many opportunities to experience learning in formal, non-formal and informal settings (see Table 5.3 below). As with the Calgary Zoo and Toronto Zoo, the Vancouver Aquarium offers school-based programming for teachers and students to engage with Aquarium educators and build connections with the natural world. School programming is available for preschool (age 3+), kindergarten and grades 1 to 12 (Vancouver Aquarium, 2015). Resources are available online for educators in preparation for field trips to the Aquarium or to plan activities and lessons in the classroom (Vancouver Aquarium, 2015). Home School Days and the Home Learner Partnership Program are offered to families and/or groups involved in home learning with interactive contributions from the Aquarium’s education coordinators and volunteers (Vancouver Aquarium, 2015). Another unique opportunity for children to learn at the Aquarium is through the Budding Scientist Research Program. This program involves a partnership with The Centre for Research on Early Child Health and Education, the Aquarium, Science World, and Strathcona Community Centre to encourage and support “science literacy for young children” (Simon Fraser University, 2015). Student and group sleepovers are open for educators wishing to bring their class to the Aquarium for an overnight educational experience where a choice of themes are offered providing participants a special opportunity to experience the Aquarium at night (Vancouver Aquarium, 2015).

Formal Education	Indirect Education
Preschool programs	Summer Programs

Grade K - 3 programs	Wet Lab: interactive learning centre featuring live marine invertebrates
Grade 4 - 7	Touchable Displays and Stations
Grade 8 - 12	Online Exhibits
Home School Days, Grade K - 12	Interactive Learning: live cams, video library, Marine Biodiversity project with blogs and video posts
Student & Group Sleepovers: overnight programs	Online Courses & Lectures: achieved courses and live streaming videos and/or achieved videos
Online Educational Resources: activities, teacher's newsletter, and lesson plans	AquaCamps: summer camp
Discovery AquaKit: educational conservation connection tool for classrooms	AquaClubs: members-only programs
	AquaVan: community outreach aquatic programs
	Festival AquaKit: educational conservation connection tool for community events
	Rockfish Abundance Survey: citizen science program
	Lingcod Egg Mass Survey: citizen science program
	B.C. Cetacean Sightings Program: citizen science program
	Great Canadian Shoreline Cleanup: citizen science program
	Ocean Wise Online Training: sustainable seafood conservation program

Table 5.3: Vancouver Aquarium Formal and Indirect Education Programs and Initiatives

Another chance to connect school groups and the community with marine life conservation is through outreach programs “featuring live animals, artifacts and activities” to inspire stewardship (Vancouver Aquarium, 2015, para. 1). AquaVan Educators offer programs, which “supplement the B.C. school curriculum guidelines” for kindergarten to grade 12 (Vancouver Aquarium, 2015, para. 1). In order to raise awareness, the Aquarium supplies AquaKits to the public so that they can make conservation connections about local and global marine life (Vancouver Aquarium, 2015). The Festival Aquakit is available for community groups, whereas the Discovery Aquakit is designed for educators to compliment lesson plans provided by the Aquarium or can be used independently (Vancouver Aquarium, 2015).

As with the Calgary Zoo and Toronto Zoo, non-formal learning opportunities are offered at the Vancouver Aquarium. Children have the chance to participate in AquaCamps during the summer months for children 4 to 12 years of age and their Youth Environmental Leaders Program is offered to children 13 to 16 years of age (Vancouver Aquarium, 2015). Summer programs are available for group bookings during the week with two themes offered on alternate days: Coastal Connections and Beachwalks (Vancouver Aquarium, 2015). Coastal Connections allows participants to spend time in the Aquarium's Wet Lab where visitors can handle and observe a number of animals, which live in tidal pools from local British Columbian waters (Vancouver Aquarium, 2015). Beachwalks High Tide and Low Tide program offers participants the chance to explore the intertidal zone on the beach in proximity to the Aquarium lead by Aquarium staff and volunteers (Vancouver Aquarium, 2015). Beginning in the fall of each year, children of families with Aquarium memberships have access to the Members-Only AquaClubs for children ages 7-11 with opportunities to engage in hands-on learning and participate in exclusive behind-the-scenes tours (Vancouver Aquarium, 2015). Other initiatives offered to the general public include sleepovers, interactive and up close animal encounters, behind-the-scenes tours, and Snappz, an exclusive Vancouver Aquarium treasure hunt game for smartphones to be played on location (Vancouver Aquarium, 2015).

Unlike the Calgary and Toronto Zoo, Vancouver Aquarium offers a distinct learning opportunity through access to online courses and lectures. Past courses and lectures are archived on the Aquarium's website for members of the public to access for free. In addition, the Vancouver Aquarium also live-stream current events via their YouTube channel (Vancouver Aquarium, 2015). The public also has the chance to become Ocean Wise Ambassadors through online training (Vancouver Aquarium, 2015). Other opportunities to experience informal

learning include watching one of the many on-site shows and programs based around Aquarium animals displaying natural behaviours for visitors lead by the Aquarium's trainers and educational interpreters (Vancouver Aquarium, 2015).

An alternate way in which the Aquarium involves and invites people to learn and participate in conservation initiatives is through citizen science programs. Each year the Aquarium invite divers to participate in the rockfish abundance survey and lingcod egg mass survey along the local coast (Vancouver Aquarium, 2014). Information gathered on these fish is imperative in determining “whether they are having difficulty recovering in the wild” (Vancouver Aquarium, 2014, para. 4). Divers take photographs of these fish, which allows researchers the ability to determine relevant information about the species (Vancouver Aquarium, 2014). Citizen science initiatives are also offered through the B.C. Cetacean Sightings Program (Vancouver Aquarium, 2014). This program encourages people who observe any cetaceans (whales and dolphins) and sea turtles “off the coast to report their sighting and send in their pictures” to help researchers understand the status of the species and the status of the population (Vancouver Aquarium, 2014, para. 5). The largest, and most notable citizen science program run by the Aquarium is the Great Canadian Shoreline Cleanup, which began as an “informal staff cleanup in 1994” (Vancouver Aquarium, 2014, para. 6). This initiative, in partnership with World Wildlife Fund, provides information on “hotspots for garbage, documents unusual trash events and informs policy solutions” and brings together local communities across Canada (Vancouver Aquarium, 2014, para. 6). In 2002, the Great Canadian Shoreline Cleanup became recognized as a national program, which is still visibly supported by the Aquarium (Shoreline Cleanup, 2015).

In addition to the staff who facilitate the aforementioned citizen science programs, the Vancouver Aquarium volunteers assist in many programs and events on and off-site. Volunteer opportunities are available for adults and youth (14 years of age and older) and range in positions and departments from administrative support to guest services (Vancouver Aquarium, 2015). Positions specifically designed to support conservation education include volunteering with Education-School Programs and Gallery And Interpretive Activities (Vancouver Aquarium, 2015). Duties for volunteers involved in education-school programs vary and range from guiding school groups on tours through the facility to leading students in “hands-on learning experiences” (Vancouver Aquarium, 2015). Gallery programming and interpretive delivery involves volunteers interacting with the public to “interpret props, displays and live animals for guests” (Vancouver Aquarium, 2015). Volunteer practicums, and externships are offered to post-secondary students while secondary students (grades 10-12) can apply for work experience placements (Vancouver Aquarium, 2015). All volunteer positions are valuable in supporting the Aquarium’s mission.

The Vancouver Aquarium, like the Calgary Zoo and Toronto Zoo, utilizes social media as a means to communicate and raise awareness about current and upcoming conservation initiatives. Twitter and Facebook allow the Aquarium to inform the public about up-to-date events concerning the facility, connect to partnerships, and show the involvement of related conservation programs. An official YouTube channel is accessible for viewers to watch on-site restricted access footage involving animal care and off-site research programs involving Vancouver Aquarium staff. The Aquarium’s AquaBlog hosts a selection of blogs featuring a variety of conservation initiatives and frequently posts updates on the latest news relating to each topic. Lastly, as with the two other case studies, the Vancouver Aquarium maintains an official

Instagram account, which allows the public to view, through photographs and short video clips, various activities, and events involving the facility.

5.4 Summary

A review of the programs offered by each of the case study zoos reveals the multiple approaches used to raise conservation awareness in the general public both on-site and online. In all the case study zoos, public education plays a foundational role. The Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium all actively engage in promoting conservation awareness through formal, non-formal and informal education opportunities. Educational opportunities are clearly available at each of the case studies. Examples of the partnerships with other institutions have demonstrated that there are wide reaching conservation and educational initiatives. These partnerships include universities within Canada and beyond, local and international conservation associations, schools, local governments and others. However it is not obvious if, or what, learning outcomes are being achieved through these conservation-oriented programs. The findings from the primary research undertaken to investigate this question are shown in the following chapter.

6.0 Revealing Perspectives: Primary Research Results

The primary research revealed quite consistent findings across the case studies both in terms of the social media analysis at the four zoological facilities and in terms of the interviews with the volunteers. The purpose of the social media analysis was to discern if there was any evidence that the public visiting zoos is learning by examining the quality of comments and responses posted to the Facebook pages of the case studies. Evaluating the content of public posts might possibly provide some insight into whether the intended conservation message is received by public audiences on and off-site.

In addition, the semi-structured interviews with the volunteers focused on the perspectives of the zoo volunteers who closely work with visitors. They were asked specifically about the impact of the conservation message that zoos were sending and receiving. Volunteers were asked about the role of zoos in education and conservation in order to determine if their own conservation ethic was influenced by their time spent volunteering at a zoo or aquarium.

6.1 Social Media Results

In recent years, zoos have been using social media such as YouTube, Facebook, and Instagram as marketing and communication tools. As such, it is important to consider the impact of the messages sent by the zoos through social media. This is evaluated through posts made by zoo visitors. The aim is to discern whether the zoos conservation mandates were having some impact on the visitors, or the visitors were primarily concerned with the entertainment provided by the zoos. The research focused on the official Facebook pages of the three case studies. They were examined to determine if this media captured evidence of learning outcomes present in zoo

visitors. Screen shots were collected and data was analyzed from May to October 2013; these months encompass the peak season for people to visit the aforementioned facilities.

The data is organized into four categories: entertainment, environmental education, conservation, and action. They are subdivided into these categories in order to ascertain if the social media pages are useful indicators of the impact the zoo's conservation programs might have on the visitor. Conversely, the data could also offer insight into what respondents chose to emphasize as a result of their visit to the zoo, e.g. if they saw zoos primarily as facilities for entertainment. The first category contains all responses that have certain attributes pertaining to entertainment. For instance, when regarding an image of two sea otters holding paws, a visitor commented on Vancouver Aquarium's Facebook page: "So cute! Love them!"

The second category contains posts that demonstrate an understanding of environmental education. For example, one parent whose family visited the Calgary Zoo commented, "My children love the zoo! It provides them with an excellent educational opportunity to see and learn about wildlife they otherwise may never see. We will be there to support the zoo!"

The third category is the recognition of conservation initiatives either on or off-site involved with the zoo. The Toronto Zoo asked the public which animal is their favourite at the zoo. A visitor responded, the Vancouver Island marmot "because you guys [Toronto Zoo] are doing a great job with the Vancouver Island marmot reproduction and release program..."

The fourth category indicates actions taken by visitors towards a conservation ethic. For example, an individual posted on the Vancouver Aquarium's Facebook page, "We live too far to be members, but we decided to participate by adopting a killer whale [financial donation]."

6.1.1 Calgary Zoo

Calgary also had a small minority of screen shots that indicated some form of environmental learning or stewardship had taken place with 70 screen shots out of a total 1326. A total of 36 responses reflected environmental education information gained by the visitor. After the partial re-opening of the Calgary Zoo following the flood in June of 2013, a visitor commented, "... Even though it was just the Canadian Wilds and Penguin Plunge that we saw, there were lots of staff and volunteers around so we learned a lot about the animals in the Canadian Wilds..."

Another visitor commented,

This Zoo holds an absurdly special place in my heart, and is easily one of the most prominent zoos in North America... I love animals and so do these people... I learned a lot about animals and nature at this zoo, but I also learned about life and history and would not be who I am today without it...

Four responses demonstrated knowledge regarding conservation initiatives and 30 responses spoke of actions relating to stewardship. A notification on the death of a female snow leopard along with information on the Zoo's Species Survival Plan for the species was posted to the Zoo's Facebook page. A member of the public declared, "I didn't realize that the Calgary Zoo had such a big part in the survival of these glorious animals!" An individual against zoos posted several comments to the Calgary Zoo's Facebook page with comments such as "No more zoos. Seeing animals behind bars is sad and unnecessary. I will never ever ever go to an animal prison, a.k.a. [a] zoo." A visitor responded to these remarks with a comment regarding the conservation efforts of the Calgary Zoo and other accredited facilities towards captive breeding and reintroduction programs:

So the world would be better off without the following species: swift fox, black-footed ferret, Przewalski horse, whooping cranes, Hawaiian crows, scimitar-horned oryx, Wyoming toad, black soft-shelled turtles, wolves, etc. Without zoo's they would be

extinct – gone forever. At least four of those [species] the Calgary Zoo has had a direct impact...

Donations are another way to gauge the impact of initiatives. For example, an anonymous donor purchased \$250 dollars worth of admissions (25 tickets) for people in an effort to rebuild the Calgary Zoo after a devastating flood in the summer of 2013; this is an example of a positive stewardship action. Multiple donations were made to the Calgary Zoo by visitors on the Facebook page in support of its ‘2 by 2 Rebuild the Zoo’ fundraiser to repair the Zoo from the flood damages. A child who collected donations in lieu of gifts for his 7th birthday donated over \$600 towards the future lemur exhibit. Another donation made to the Zoo was from Eagle Lake Nurseries who supplied 2,000 pounds of fresh willow, and Bowden Farm Fresh Chickens who provided 300 frozen chickens to help feed the animals after the flood. The Toronto Zoo had a much smaller number of posts, but with a similar percentage of posts in each of the categories.

Calgary Zoo Social Media

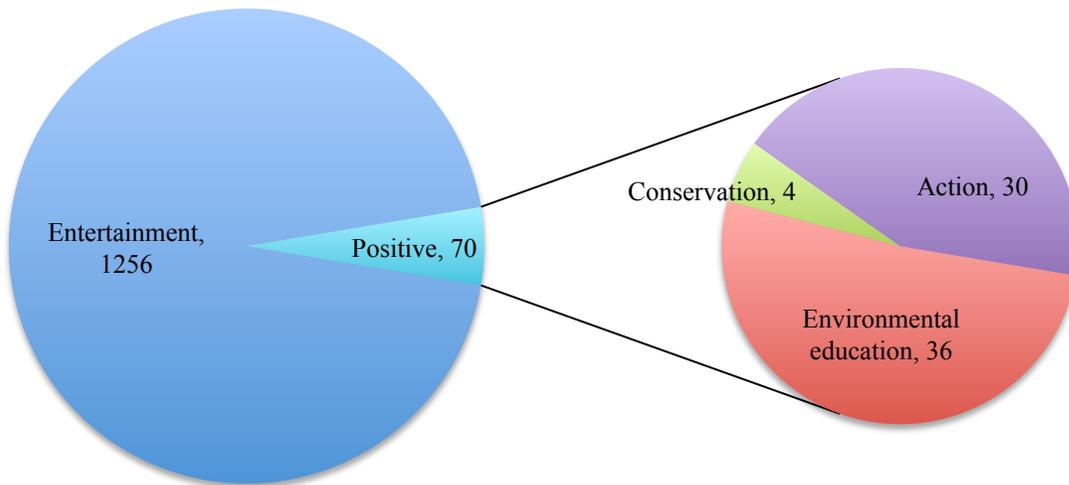


Figure 6.1: Calgary Zoo Social Media Findings

6.1.2 Toronto Zoo

The Toronto Zoo's social media pages also included a minority of responses with respect to stewardship and learning with 21 screen shots out of a total 382 indicated responses. A total of 10 responses reflected environmental education information gained by the visitor. A visitor remarked, "They [Toronto Zoo] have great programs and it is a wonderful way for kids and adults alike to learn so much about animals..." In response to the post made by the Toronto Zoo on the departure of its three African elephants to a sanctuary in California, a visitor reflected on a past trip to the Zoo thanking a former elephant keeper from whom they "... learned a lot about elephants, their emotions and behaviour." Another visitor declared, "We love Toronto Zoo and it is by far one of the best educational and fun outings we have with our kids!" Two responses demonstrated knowledge regarding conservation initiatives and nine responses spoke of actions relating to stewardship. The first conservation-related comment came in response to a post from the Toronto Zoo asking the public to name their favourite animal and why. A visitor commended the Zoo on its captive breeding and reintroduction program for the Vancouver Island marmot and went on to say they "... support the Vancouver Island marmots through the Adopt an Animal program and the foundation in B.C." The second comment replied to a video post presented by Adopt-A-Pond on how to help a snapping turtle cross the road saying, "It's helpful to have tips and tricks..."

An example of a stewardship-related action is the symbolic adoption of a panda given to a visitor from her children for Mother's Day. Another instance of stewardship action is the raising of \$700 in honour of the clouded leopard's birthday with the proceeds directed to the Zoo's endangered species fund and its reproductive physiology breeding program. Finally, several visitors responded to the Toronto Zoo's post asking the public to vote for the Zoo in the

Shells FuellingChange grant contest. The grant would be applied to the support of polar bear related initiatives in education, conservation, and research. Despite a larger percentage of visitor actions indicated, the Vancouver Aquarium's Facebook page showed similar results related to the distribution of comments across categories.

Toronto Zoo Social Media

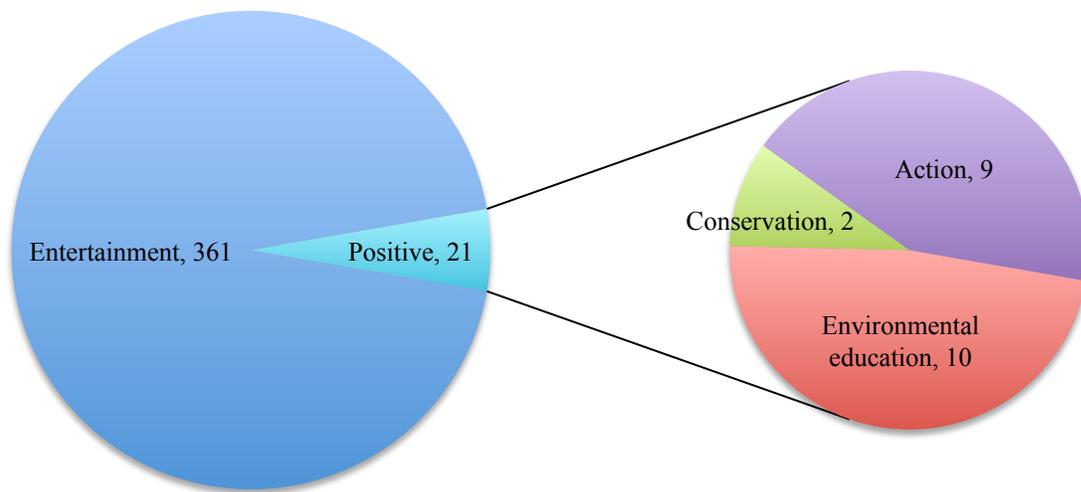


Figure 6.2: Toronto Zoo Social Media Findings

6.1.3 Vancouver Aquarium

Finally, for the Vancouver Aquarium’s social media research, 15 screen shots out of a total 377 indicated a degree of stewardship or learning had taken place. A total of five responses reflected environmental education information gained by the visitor. Vancouver Aquarium created a “Top 10 Reasons to visit the Aquarium” asking the public to reply with their top reason for visiting. One visitor responded, “Education. We always learn something new every visit... It is about making education entertaining and always doing what is best for the creatures kept.” Following another Top 10 post by the Aquarium, a member of the public responded their top reason for

visiting is: “The fact that the Vancouver Aquarium does research and active education every single day. As well, their shows are both educational and give the animals a purpose and are not solely for the entertainment of the guests.”

One response demonstrated knowledge regarding conservation initiatives and nine responses spoke of actions relating to stewardship. The post pertaining to conservation is from a guest replying to the Aquarium’s Top 10 reasons for visiting post with the response, “This is why I come: conservation, rescue and rehab efforts!” An example of actions and demonstrations of stewardship is through the voting efforts of visitors in support of the grant contest opportunity the Aquarium was involved in to support the Marine Mammal Rescue Centre. Another instance of stewardship is the participation of volunteers signing up for the Great Canadian Shoreline Cleanup. Finally, in honour of Sea Otter Awareness Week, a visitor wrote a song about the species, which was then shared on the Vancouver Aquarium’s Facebook page.

Vancouver Aquarium Social Media

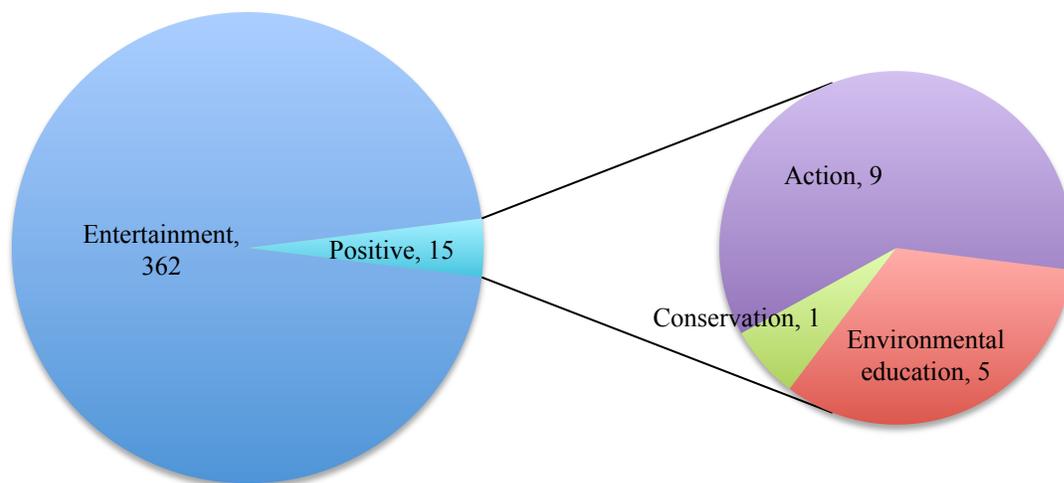


Figure 6.3: Vancouver Aquarium Social Media Findings

In sum, the social media analysis of all zoos investigated consistently revealed that the majority of comments posted emphasized the entertainment value of the zoo as opposed to conservation or education. The social media findings will be discussed in the next chapter. Before critically analyzing the social media data, the data gathered from the volunteer interviews is summarized.

6.2 Volunteer Interview Results

Volunteers from the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium were interviewed for this study to help determine whether zoos contribute to conservation through environmental education. Assiniboine Park Zoo was not included in this study. Upon inquiry, the researcher was informed that Assiniboine's volunteers are primarily suited to customer service purposes and not public education and the Zoo declined to participate. Interviewing volunteers from the remaining three case studies offered information about the educational mandates of zoos and how these facilities can most effectively foster conservation through educational programs. The zoo volunteers were well placed to answer these questions because they have been committed park visitors, learners, and educators. Each has volunteered at their facility for at least a few months, though many of the volunteers have been present for years or decades.

The findings for each zoo are grouped into three sections. The first section involves personal questions and commitment to volunteerism to ascertain a demographic of the average age categories of the participants and their rationale for volunteering, etc. Building on this, the second category contains information about what volunteers view as the role of zoos and why they think that they are important. The third grouping contains questions about links to education, with the final category connecting links to conservation and stewardship.

6.2.1 Calgary Zoo

Six participants were interviewed from the Calgary Zoo (CZ). Five of six volunteers involved in the study were in the age range of was 50-75 (CZ: 1, 2, 4, 5, 6). One participant fell between the 25-50 age ranges. The length of time volunteers participated in the docent/volunteer program varies from 3 ½ years to 18 years. When asked how they first discovered about opportunities to volunteer with the Zoo, three participants learned through visiting the Zoo (CZ: 3, 5, 6), two through a friend (CZ: 2, 4) and CZ: 1 was volunteering for a city operated historical site and began volunteering for special Zoo events associated with the site. The amount of hours participants volunteer at the Calgary Zoo differs. However, while 80 hours must be fulfilled per year per volunteer, the responses all varied from as little as 1 ½-2 hours per week to the highest number being 6 hours per week. In addition to their positions at the Calgary Zoo, five of the six participants volunteered outside of the facility (CZ: 2, 3, 4, 5, 6). Positions varied from work involving local wildlife rescue to community and gardening positions.

When asked why the participants volunteered their time to the Calgary Zoo, the most popular reasons were “sharing with others,” (CZ: 1, 3, 5, 6) and a “love of nature/animals” (CZ: 1, 4, 5). One volunteer commented, “I volunteer at the Zoo because I truly believe if I can change one kid, open one kid’s eyes or adult’s eyes and they talk to 10 people that could be 10 people who will make positive changes for our natural world” (CZ: 2). Participant activities vary and include: sleepovers, touch tables, guided tours, children’s public and curriculum-based programs, behind-the-scenes, animal handling, and gardening related programming. Asking why the volunteers engage in these particular activities, the most frequent response was the chance to share information with the public along with their personal enjoyment of being at the Zoo (CZ: 1, 4, 5). Another volunteer involved with more behind-the-scenes volunteering remarked their

preference for filling positions that do not directly involved the general public and crowds (CZ: 2).

The following responses help to determine participant's perspectives on what the Zoo's role is. Having asked individuals what their perspectives on animal conservation are, all six participants believe it to be an important issue. Every participant remarked in one way or another that humans must take action. "If we don't do it we're hooped. What happens to them happens to us" (CZ: 5). The need to create awareness through education was mentioned (CZ: 2, 3) and the preservation of species, including plants and the protection of habitat was also noted. Naming habitat loss as the main issue for loss of species, CZ: 6 laments,

Sometimes I despair of humanity. Quite often actually... life is so complicated in your own terms that the energy left for other things weakens and I think that's probably what's happening generally with the world, which is a very sad thing because it's not only animals that suffer its poverty of people in all sorts of things...Awareness for people of things beyond their immediate sphere of activity is becoming less all the time.

Participants were able to name several local and global conservation initiatives involved in promoting animal conservation. Local and Provincial initiatives include Rocky Mountain Animal Rescue and Medicine River Wildlife Centre to global initiatives such as World Wildlife Fund and Greenpeace. When asked where accredited zoos rank in their promotion of animal conservation, the majority replied they would list high in position. One of the two volunteers said, "I wouldn't put the Zoo up there because there's too much politics involved. Where anytime you have any kind of organization and politics always takes away from the good, people make bad decisions because of politics or money and then they lose the plot so I wouldn't put zoos at the top" (CZ: 2). Another responded the Calgary Zoo would be equal in promotion to organizations such as Nature Conservancy and Canadian Parks and Wilderness Society (CZ: 5).

All six participants feel the Calgary Zoo is able to effectively meet its mandate. One way

in which this is being achieved is "...with their move towards only housing animals that they are supporting in the wild it will help people in understanding that there is a link between what they're seeing and what they're helping to protect" (CZ: 2). Other roles accredited zoos play, according to the volunteers, is research, breeding, and reintroduction programs (CZ: 1, 4, 5). "Zoo's have got the expertise, the leadership, the education and the quality control element to lead our communities forward" (CZ: 4). Also, the opportunity to showcase animals receiving quality care and meeting wellbeing standards sends a positive message to visitors (CZ: 2, 6). All volunteers said that accredited zoos are important. The primary way they are deemed important is in the ability to educate the public through the up close opportunities to make connections with the animals on-site. "There is a reason to believe zoo's provide [a] living catalogue or living museum of animals that may or may not ever be on this earth again" (CZ: 2). Two other participants share this sentiment. "Calgary Zoo is educating young kids, inner city kids [who] wouldn't get to see nature in its own environment" (CZ: 4). "You can't make a connection with an animal by watching on television. To have a physical connection can make a world of difference [and] make them realize that these animals have personalities and connect more so than what's on TV... people need that actual connection and that makes a big difference to how you feel about something" (CZ: 5).

Volunteers were asked what is special or unique about the Calgary Zoo. For one volunteer, the Calgary zoo is a place to create memories and enjoy an exceptional experience (CZ: 1). Two volunteers note the warm and welcoming atmosphere of the Zoo and its staff and volunteers (CZ: 3, 4). In the minds of the participants, Calgary Zoo is set apart from many North American zoos due to its proximity to downtown Calgary, its accessibility for visitors to frequent the site, its showcasing of local wildlife (Canadian Wilds), animatronic dinosaur display and

conservation partnerships with other countries (Wechiau Hippo Sanctuary in Ghana, West Africa) (CZ: 1, 2, 5, 6).

With regards to whether zoos provide learning opportunities for visitors, all participant responses were “yes.” According to all of the Calgary Zoo volunteers this is achieved in many ways through both formal opportunities (e.g. education programs) and informal opportunities (e.g. speaking with volunteers, Keeper Talks). Other responses offered include: biofacts, signage, public programs and camps, and behind-the-scenes. Information used by five of six Calgary participants to establish if accredited zoos are effective in promoting public education includes personal experience and observation (CZ: 1, 2, 3, 5, 6). CZ: 4 relies on the “Volunteer Voice” newsletter distributed once a week along with Master Gardener meetings for feedback on up to date information on what is happening in the volunteer department and the Zoo in general. CZ: 5 is confident that public education is in effect given every [Keeper Talk] has some sort of conservation message behind it, “you [just] don’t pound it into them [visitors].”

Of all the different avenues previously identified that lead to learning in visitors, volunteers were asked how Calgary Zoo most effectively provides the learning opportunities to the public. The quality training received by education staff and volunteers to disseminate to the public is noted as being the most effective by four of six volunteers (CZ: 1, 2, 4, 6). As noted by CZ: 2, “I think where accredited zoos excel is when they have educators that can bring the animal, [and] its life out in such a way that it resonates with the visitor. If it resonates with the visitor they will remember that. I think the educators make the biggest difference.” Public and curriculum-based programming was also mentioned by the volunteers as successful ways for the public to learn while visiting the Calgary Zoo (CZ: 3, 5). Consequently, upon asking if the participant’s role as a volunteer contributes to educating visitors, all six responded “yes.”

Gathering insight into personal perceptions of what the Calgary Zoo means to volunteers, two-thirds of the participants receive enjoyment from their time at the Zoo. Personal time, socializing, and opportunities for family bonding are all fulfilled by time spent at the Calgary Zoo (CZ: 1, 3, 4, 5). Two volunteers who both volunteered for an extended number of years felt differently about their perceptions of the Zoo from their beginnings as docents.

I must admit it has changed dramatically from when I first started and as volunteers I don't believe we are as valued as we used to be. I think it's politics. When I first started education [was] in charge of the volunteers and so you got feedback all the time... I believe we are a commodity and we're not people anymore and that's sad. (CZ: 2)

CZ: 6 echoes this disappointment, "The first time it was such a thrill to qualify (docent training) and be given the responsibility that we were... because of the lack of responsibility that we've been given it's not really as gripping as it was before."

Regarding the Zoo's role to the visiting public, all of the responses indicated entertainment and recreation. Two volunteers feel education entwined in the Zoo's role alongside the fun factor (CZ: 1, 2). Along with the role of the Zoo in visitor's lives, the role of the Zoo in city life is reviewed with similar results. Half of the participant's feel the Zoo resonates strongly within the city supporting local and community oriented events, particularly after the flood (CZ: 4, 5, 6). "On poor weather days they [Calgary Zoo] offer a discount to encourage visitors to come" (CZ: 2). While being close to the city, one volunteer was unsure if the Zoo serves a function for the city (CZ: 2). The remaining participants feel the Zoo provides green space (CZ: 3) within the city as a link to nature and as a tourist attraction (CZ: 1).

According to the volunteers, visitor perceptions of the Calgary Zoo are predominately positive. One of the concerns addressed by CZ: 3 is the lack of understanding of what happens

behind-the-scenes (outreach and reintroduction). Expanding visitor knowledge of these activities could serve to reinforce Zoos' image as a place for conservation, not just entertainment. In addition, informing visitors of these activities could lead to their participation in certain conservation initiatives. When asking the participants if their own perceptions have changed since becoming a volunteer, all replied that it has changed in some way. For example, CZ: 2 notes,

Volunteering feeds my autodidact personality, which is it's always nice to learn. I don't like to remain stagnant and even when you've learned as much as you can learn about one particular animal they'll go and do something so unexpected you're just left shaking your head.

Most of their outlooks changed for the better with four of six volunteers having learned about all of the work involved at the Zoo in multiple facets (CZ: 1, 2, 3, 4). For instance,

I didn't realize the extent of the programs, and visitors too realize it's not just the animals, it's the conservation, it's the behind-the-scenes, it's the horticulture... It's so much more than what the kids see... A lot of people don't have the same perception as me and don't realize the class act the horticulture department is. It's the hidden secret of the Zoo and how much work and effort is put behind it... (CZ: 4)

Two participants' perceptions changed negatively since volunteering at the Zoo because of politics and as a result stopped donating money to the Zoo on account of not knowing where the money was being spent (CZ: 5, 6). "I started specifically giving money to specific people for specific things because I knew where it was going. I'd be more inclined to just go and find what a keeper needs and buy it for them and give it to them than I am just to donate money" (CZ: 5).

Finally, the Calgary Zoo has influenced the actions of half the participants beyond volunteering. Since becoming a volunteer at the Calgary Zoo, CZ: 1 began recycling more, using less disposable products, and fewer pesticides in the garden. Whereas CZ: 5 began donating to an NGO affiliated with the hippo outreach efforts, "which was strictly as a result of being at the

Zoo.” CZ: 6 donates to the Zoo, is involved in a local wildlife rehabilitation centre and contributes to local school presentations on endangered Canadian species (Vancouver Island marmot). The volunteers from the Toronto Zoo share similar motivations for volunteering and educating visitors, but also express concerns about environmental education at the Toronto Zoo.

6.2.2 Toronto Zoo

Sixteen participants were interviewed from the Toronto Zoo (TZ). Ages ranged from under 25 to over 75 with 13 of 16 volunteers between 50 to 75 years of age (TZ: 1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16). Length of volunteer times varied from less than a year to as long as 38 years. When asked how they first learned about volunteering at the Zoo, seven of 16 said it was from visiting the Zoo and seeing on-site volunteers (TZ: 4, 6, 8, 9, 10, 14, 16). Other responses to learning about volunteering included: newspapers, websites/social media, and friends/spouses. Only one participant could not recall where or when they first learned about the volunteering opportunity at the Zoo. Hours dedicated to volunteering at the Toronto Zoo differed. The least amount of hours spent volunteering per week was three hours, while the most amount of hours per week was 13 hours. Half the participants dedicated on average three to four hours per week (TZ: 1, 3, 7, 8, 12, 14, 15, 16). With regards to other volunteer positions outside of the Zoo, 10 of the 16 participants volunteered elsewhere (TZ: 3, 6, 7, 8, 10, 12, 13, 14, 15, 16). Positions were diverse from volunteering with hospitals, to conservation organizations, to local community initiatives.

With respect to why the participants volunteer at the Toronto Zoo, 10 of 16 responded it was their love of “animals,” the “environment,” “nature/outdoors,” or the “Zoo” (TZ: 2, 5, 6, 7, 8, 10, 12, 13, 15, 16). Continuing this, a few volunteers explicitly cited their desire to share and educate others about the conservation message the Zoo is attempting to convey. One volunteer

offers, “I want to be part of that movement bringing awareness to visitors to know that zoos aren’t just a place to see cute animals and see fuzzy pandas. It’s kind of a forefront of bringing awareness to conservation for endangered animals” (TZ: 11). Another volunteer says, “ I volunteer at the Zoo because is my opportunity to plant seeds. I don’t garden, I’m not a scientist, I can’t fix the issues in the world but I can inspire other people to do it so that’s why I do it” (TZ: 9).

Volunteer activities range from seasonal to year-round, single responsibilities to multiple positions. Seasonal volunteers participated in working the panda stations in the Panda Interpretative Centre (TZ: 1, 7, 11). The remaining volunteers were involved in other activities including: wayfinding stations, interpretive touch tables, off-site events and outreach, special events, guided tours, animal behaviour observations, office administration (creation of library system for animal photos), and workshops (paid position). When questioned why the volunteers participate in the above-mentioned activities, 14 of 16 responses involved socializing, either with the public, the staff, or fellow volunteers and opportunities to educate the public about animals and the Zoo’s conservation efforts in protecting endangered species (TZ: 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16). One volunteer says “I firmly believe that each person, if you become properly focused, can bring about some small measure of change that leads to the betterment of whatever you choose to get involved with” (TZ: 13). A second volunteer commented, “I like to maximize the opportunity to bend minds towards concern for the environment” (TZ: 6). Still a third volunteer reflects volunteering, “Keeps me young. By sharing with people, by talking to people. I guess it’s the interaction with people. I also like the idea of conservation of species” (TZ: 7).

Having established an understanding for why the participants dedicated their time to

volunteering at the Toronto Zoo, the following results help to ascertain what the volunteers believe the function of zoos to be and if they are significant. With respect to volunteer perspectives on animal conservation, all 16 participants believed it to be of importance. “I think for the benefit of the world we have to take greater measures to preserve it” (TZ: 15). Seven of 16 expressed this sentiment, naming education opportunities and greater awareness as imperative to protect biodiversity (TZ: 3, 5, 7, 8, 10, 12, 16). Other volunteers expressed the importance of conservation roles within zoos such as Species Survival Plans, and habitat restoration. Using the plight of polar bears in the Arctic as an example, one volunteer said, “You can’t reintroduce animals into the wild where there isn’t any wild for them to go back to” (TZ: 13). Another volunteer stated that while animal conservation is important,

I think it needs a lot more work. I think that we are in an infant stage where we don’t know a lot of things. We’re experimenting. How can we do, what do we need to do? What is the best way to do [animal conservation] because there are so many perspectives? Should we interfere, or is this a natural process? How much should we interfere? Is it our fault and should we therefore take responsibility? So I think that it’s a lot of trial and error that’s going on right now, but I think that we have to do it - that we can’t just sit back and say yeah que sera. (TZ: 9)

Canadian Wildlife Federation, Nature Conservancy of Canada, and World Wildlife Fund were often mentioned when volunteers were asked the names of facilities or initiatives that promote animal conservation. Volunteers were able to list both local and global initiatives. When asked where, if anywhere, accredited zoos ranked on this list 13 of 16 volunteers mentioned they are important and high on their lists (TZ: 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14, 15, 16). The remaining three volunteers felt zoos would not rank higher than other initiatives because every animal conservation initiative plays a role in conserving animal populations around the world. Two volunteers (TZ: 2, 9) stressed the relevance of zoos with the opportunity to view animals up

close "... it's just so much better than watching on TV and if you can see it [an animal] and you make that heart connection then you can't not care. So I think that it's one of the most effective places to work with conservation" (TZ: 9).

As previously discussed, zoos' mandates have been changing to foster public education towards conservation. When questioned about the Toronto Zoo's ability to perform this role effectively, 11 of 16 volunteers believe it does (TZ: 1, 3, 4, 5, 7, 8, 10, 11, 13, 14, 15). Of the five volunteers who did not say yes, the responses were all neutral. For example, one volunteer expressed "I think there are areas of the Zoo where they are trying [and] I think there are areas of the Zoo where they are not. The bottom line is money" (TZ: 12). All of the volunteers, when asked what role they see accredited zoos playing, replied with responses of either protecting endangered species or raising awareness and providing education to the public. "Educating people for the need for conservation [and] actually breeding animals that are endangered or disappearing in the wild... Drawing attention to the fact that it's not the animals' fault. The animal is something that shares the planet with us, not something that should be subjugated to us" (TZ: 12). Protecting endangered species, learning to love and appreciate animals, maintaining populations through Species Survival Plans, and collaborating with other zoos were all mentioned. Thus, all 16 volunteers when asked if accredited zoos are important responded "yes." Following this question to determine which ways they are important, 15 of 16 volunteers replied with similar responses to Question #5 (What role do you see accredited zoos playing?) (TZ: 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16). TZ: 7 responded, "The fact that I don't know much about the organization [AZA/CAZA] I would think that they need to advocate for themselves and say more about what they do and why they are important. I wish I knew." All other responses mentioned themes relating to conservation (breeding), education (programs) and

awareness (animals as ambassadors). Asking the volunteers what they found unique and/or special about the Zoo, 7 of 16 said the size of the Toronto Zoo makes it unique and special (TZ: 2, 4, 7, 8, 10, 13, 14). The landscape organization (zoogeographical) of the site, volunteer program experience, overall experience (“family place”) and the dedication of the keepers to their work and the animals were also identified as special to the Toronto Zoo.

Volunteers, when asked if zoos provide learning opportunities for visitors, gave a nearly unanimous response of “yes.” The two outstanding responses (TZ: 7, 12) were neutral. TZ: 7 said, “...It depends on the setup of the zoo” and TZ: 12 was unsure of whether or not an educational mandate was necessary for the accreditation process “... but maybe it should be part of their [AZA/CAZA] list.” The follow-up question asked if zoos do indeed provide learning opportunities for visitors, and if so, how do they do this. Responses ranged from passive learning opportunities such as signage to active and experiential learning through curriculum-based programs and interacting with volunteers on-site at interpretive touch tables. Other ways in which the public can learn according to the participants is through outreach opportunities including special event days (e.g. International Giraffe Day), public programs, Keeper Talks/Casual Encounters, animal presentations, partnerships with conservation initiatives in other countries, press releases, marketing, and the Zoo’s website. Interacting and engaging with on-site staff and volunteers was most frequently mentioned as effective for the public. TZ: 14 said, “interpretation is more personal” while TZ: 13 believes speaking with volunteers at interactive touch tables to be a “positive learning experience for adults” with the rationale that “If you get to the children you get to the parents, if you get to the parents you get to the children” adding that for any age, “being tactile is a good thing.”

Volunteers were then asked what information they themselves are using to determine if

accredited zoos are effective in promoting public education. Ten of 16 responded that it is through other peers (volunteers) and through personal observation, i.e. from what they have seen or heard from guests (TZ: 1, 3, 6, 8, 9, 11, 12, 14, 15, 16). Four participants were unsure and/or not using any sources to determine the effectiveness of zoos' promotion of public education. Other responses included feedback from staff and teachers participating in curriculum-based programs, and in certain circumstances, news coverage.

Keeping in mind all of the examples of learning opportunities available for visitors, volunteers were asked what the Zoo does to provide the most successful learning opportunities to reach visitors. The most popular response is through interacting with volunteers and through outreach and advertising efforts such as the Zoo newsletter, television, their website, and outreach for community events (TZ: 1, 6, 9, 10). One volunteer spoke passionately about summer programs available for the public, in particular Zoo Camp. “[By] providing wonderful summertime opportunities for the children who come back year after year and therefore you’re getting that year-round wish from children to go back out and visit the Zoo... So I think the most effective thing that we’re doing is the appeal that we have that the children enjoy...” (TZ: 13). Participants were finally asked if their role as volunteers contributes to educating visitors and all sixteen participants said “yes” they hope it does.

The remaining questions gathered volunteer insights into their perspectives on conservation and stewardship. Upon asking what the Toronto Zoo means to the individual personally, all participant responses reflected that the Zoo fulfills their need to learn and educate others. For example, TZ: 13 says,

What it does give me is continuous ongoing education in the animal world and the world of wildlife in general so that to me is fascinating. The Zoo provides for very specific learning in both their staff and their commitment and what they’re doing for conservation

and new exhibits, what's coming on exhibit and what's being improved, the whole ebb and flow of life.

According to the volunteers, the Toronto Zoo is a place to pursue their passion and personal interest of animals and a place to socialize with other like-minded individuals and to enjoy with family. TZ: 8 reflects,

In terms of what the Zoo means to me, and the part the Zoo plays in my life, [it] is part of my relationship with my grandchild. Each year since she was old enough to go to Zoo Camp we've put her in Zoo Camp for a week. She looks forward to it in the summer. The Zoo is something that we share together so it has become a bit of a bonding experience for us. We also visit the Zoo together and sometimes with her mother, my oldest daughter. My grandchild has been learning about the Zoo animals her entire life so far.

Expanding on this question, volunteers were asked to respond with what they believe the Zoo's role is in visitor's lives. The 12 of 16 responses included learning and connecting with nature and animals (TZ: 1, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16). Of those responses, nine included attraction/entertainment as part of the experience. Participants were asked what role the Zoo plays in city life, given its proximity to downtown Toronto. Six of 16 responses mentioned zoos being a place for learning and an opportunity to see native and non-native wildlife (TZ: 2, 3, 10, 11, 13, 15) and five of 16 think it serves as an attraction/entertainment centre (TZ: 4, 9, 12, 14, 16).

Participants were then asked how visitors perceive the Zoo. All participants reflected that overall visitor experience from their perspective has been positive. "I think people have a good time. They went [on] the carousel, they went on a camel ride or the zip line. Whether they remember they saw the orangutans and the tigers or not that may be different" (TZ: 12). This comment reflects the enjoyment of visitors to the Zoo, however, visitors may not always view it as a place to come and learn. While enjoyable, volunteers believe visitor's perceptions of the Zoo

are a place for entertainment and attraction. Volunteers noted that while the majority of visitors leave with a positive experience, they have had visitors overwhelmed by the Toronto Zoo's size and find the amount of walking to detract from their experience (TZ: 4, 14). After becoming a volunteer at the Toronto Zoo, participants were asked if their own perceptions changed.

Responses indicated that volunteers became more aware of the efforts of the Toronto Zoo, with respect to its conservation initiatives that were not as apparent to them as guests alone. Two volunteers commented that during their time as a volunteer they noticed negative changes to the Zoo, which affected their outlook of the facility. One volunteer has noticed that the uniformed staff are not as knowledgeable about the Zoo as they once were (TZ: 13). Another volunteer said that while gaining respect for the keepers and horticulture staff, they have lost respect for how the Zoo is operated with the influence of politics on decision making and the utilization of space and marketing (TZ: 16).

Lastly, in terms of any additional conservation action taken by Zoo volunteers beyond volunteering, 6 of 16 all said they donated money to conservation organizations or causes (TZ: 4, 5, 6, 12, 13, 15). Other actions indicated by volunteers include being inspired to write and to become vocal about conservation issues (TZ: 1, 2, 8), having a greater awareness of environmental and animal conservation issues (TZ: 3, 4, 9). Still other volunteers have made changes to their habits since becoming involved with the Zoo either through recycling or efforts in reducing their carbon footprint (TZ: 6, 14, 15). Participants who did not take additional actions to promote conservation since being a volunteer noted they have a prior conservation ethic established in life. The Zoo provided opportunities to make certain conservation practices more convenient (e.g. cell phone recycling) but did not necessarily serve as the catalyst to invoke the habitual change in their lifestyle.

6.2.3 Vancouver Aquarium

Eight participants were interviewed from the Vancouver Aquarium (VA). The seven of the eight participants were between 25-50 years of age (VA: 2, 3, 4, 5, 6, 7, 8). Only one volunteer was in the age category of 50-75. The six of the eight volunteers have been volunteering for less than one year (VA: 2, 3, 4, 5, 6, 7), while the rest have been volunteering for a year or more. Half of the participants learned about volunteering opportunities through a visit to the Aquarium (VA: 1, 2, 3, 7). The remainder became aware through the Aquarium's online presence, a family friend or Aquarium membership emails. Hours spent volunteering at the Aquarium average to four per week for half of the volunteers interviewed (VA: 4, 5, 6, 8). The most amount of hours dedicated in a week noted were 8-12 for special events on-site and 15 hours for one individual during a period of unemployment. Regarding other volunteer positions external to the Aquarium, half of the participants volunteer outside of the Aquarium (VA: 1, 2, 3, 7). Positions range from municipal elections to time at the University of British Columbia Botanical Gardens to local conservation efforts through B.C. Nature.

When asked why the volunteers chose to donate their time to the Vancouver Aquarium, five replied it was their passion for the environment and animals as well as the drive through personal interests in marine science (VA: 1, 2, 3, 5, 7). Others noted the importance in providing education to the public and how the Aquarium allows for experience in educating individuals in an enjoyable and interesting way (VA: 1, 2, 3, 4, 5, 8). Activities of participants varied from seasonal (Marine Mammal Rescue Centre) positions to year-round opportunities. Positions include gallery educator (VA: 1, 3, 4, 5), AquaLab and WetLab volunteer, guided curriculum-based tours, and gardening and plant maintenance within the Amazon Gallery. Building upon

this, the participants were asked why they engage in the aforementioned activities. Five of the responses indicated a desire to disseminate information and provide connections to the public about the environment, oceans and aquatic life (VA: 1, 2, 3, 5, 8). Other reasons for participating in the Aquarium's volunteer activities include personal interests (VA: 4, 6, 7).

All eight participants at the Vancouver Aquarium believe animal conservation to be of importance. VA: 1 and 2 expressed reservations about the ways in which conservation is being addressed. VA: 1 says, "I'm leery of blanket generalizations... I'm often raising questions about how do we know this is one of the best practices we should be doing." VA: 2 is similarly conflicted in conservation practices saying, "My views on animal conservation are that it needs to start with education, but I don't know if white North America, rich North America is the place that is going to get a lot of that really good work done outside of our own provinces and our own states." Another volunteer expressed concern for plant loss, particularly plants found in the Amazon with the understanding that the plants are imperative in feeding the diets of threatened and endangered species (VA: 7). Following this, participants were asked to identify local or global initiatives that promote animal conservation. The Aquarium along with other affiliated organizations and initiatives were mentioned (Cetacean Sightings Program, Ocean Wise, and Marine Mammal Rescue Centre) among other international efforts (WWF, AZA, and Sierra Club). Asking volunteers to rank accredited zoos as places that promote animal conservation amongst the local and global initiatives led to differing responses. The most common response is that they are very high up in their position. "You can watch all the videos you want and to listen to all the people you want, but there's nothing like seeing a real live animal in front of you and getting to relate to [it]. So I think it's a really strong important impact, and I'm a great defender of zoos and aquariums" (VA: 1). Other responses identified zoos being important for animal

conservation but would rank it no higher than other initiatives. For instance, VA: 4 says, “They [zoos] play a really important niche role under those circumstances, but ideally I would put the preventionary things ahead of them.” One volunteer would rank the Aquarium lower with concerns involving economic accessibility.

A lot of places I see don't have programs for people who don't have money or don't even have admission rates for people who don't have money. So I feel like that's a huge barrier especially in Vancouver where the cost of living is so ridiculous and there are a lot of poor people. Their [Vancouver Aquarium] focus is really on their local ecosystem, which is really important and great and I love that they connect... they do lots of stuff in British Columbia. I think it's so important to get people who live in British Columbia and live in Vancouver to go to do this thing [visit]... That's one of my big qualms with the Vancouver Aquarium is that they don't have a way for people who cannot afford to take their family for \$114 for a couple of hours. They don't have a way for people to access them so that's a strike against them. As opposed to these other institutions whose kind of goal is to empower people without money and to make information freely accessible. (VA: 2)

The majority of volunteers think that the Vancouver Aquarium has the ability to achieve its mandate effectively with the exception of one participant who feels the Aquarium has influence to effect positive and active changes, but is unsure of its effectiveness in “the end result of things” (VA: 7). Regarding the Aquarium's involvement with Ocean Wise outreach efforts in particular, a volunteer reflects, “It's really growing and I'm quite pleased especially with the sustainable seafood. I don't think I've seen as much of a sway in this short period of time in terms of conservation action as that” (VA: 2). Another volunteer commented about the Ocean Wise program's influence in the city saying, “You can go to any restaurant in Vancouver and see that symbol. So it's permeating the public whether someone is at the Aquarium or not” (VA: 5). This is a very clear instance of zoos facilitating environmental education and conservation initiatives in their communities through outreach, and should be used as an encouraging example for other

zoos to pursue similar projects.

Regarding the role of zoos, half of the responses indicated education and conservation as its major function (VA: 1, 2, 4, 6). VA: 5 says zoos serve as a “platform for this easy way to deliver education to people without them having to seek it out themselves.” In addition to the education role a few volunteers view zoos as places for the public to connect, inspire, and have exposure with nature and wildlife. “I think accredited zoological institutions are in a really unique position to create that connection between people and animals” (VA: 8). Other responses included zoos as places for research and to view animals as ambassadors for wild species (VA: 3, 5). With these perspectives, all participants collectively agreed that zoos are important. While many volunteers believe the importance of zoos center around foundations of research, education, and conservation, two volunteers expressed cost barriers in accessing these places (VA: 2, 5). “If the goal is conservation for aquatic life or land mammals they can bring that out to the public with events and education opportunities outside of the facility because not everyone can get the [financial] requirements for the aquarium” (VA: 5). Two other volunteers mentioned the importance of accreditation itself. VA: 3 views zoos as places that set standards on how to care for animals and treat wildlife: “If you see noncompliant things... as a child or as a teenager when you still need examples where you don’t... know yourself what to do, accredited zoological institutions can set positive examples on how to care for animals” (VA: 3). VA: 7 remarks, “accreditation is extremely important so that they follow socially, morally, ethically sound practices that other accredited institutions must follow.”

After establishing the significance of zoos, participants were asked if there is anything unique or special about the Aquarium itself. The facility itself and its local connections within the city proved to be the categories stated by six of the volunteers (VA: 1, 2, 3, 5, 6, 7). Its

proximity to the ocean, aesthetics, active role in the community and display of marine environments with a West Coast focus were all cited as also marking the Aquarium as special to the volunteers. Other ways in which the facility was recognized as unique or special included: staff and volunteer enthusiasm and support, its education efforts (e.g. camps, special events), conservation (e.g. Ocean Wise) and research efforts (e.g. Marine Mammal Rescue Centre).

All eight participants agree that accredited zoos provide learning opportunities for visitors. When asked how this is achieved, volunteer interaction, namely through gallery educators, was mentioned in five of the eight responses (VA: 1, 4, 6, 8). “Interpretive programming mostly. More importantly they do it through contextualization for the public. [This is] focused by helping them understand in a [non-academic], cause-and-effect way about pollution and about [their] choices” (VA: 2). As well, seasonal and year-round education programs and seminars, animal shows and display information was also mentioned. The Aquarium’s website, special events, Ocean Wise program, and information offered to volunteers were also listed as ways for the public to become involved in learning at the Aquarium. One volunteer reflects, “Given that you’re in a non-structured teaching situation it’s a great way to teach because it sneaks up on people because they are relaxed. The combination of this is neat... such a great opportunity for that interaction” (VA: 1).

Six of the volunteers revealed personal experience as their gauge in determining if accredited zoos are effective in promoting public education (VA: 1, 2, 4, 6, 7, 8). “It’s very anecdotal. It’s based on my first-hand experience and observation. That’s it” (VA: 4). The two other participants reference attendance at programs and reading the news, as a means for determining the effectiveness of a zoo’s promotion of public education. When asked what the Aquarium does to provide the most successful learning opportunities to reach visitors, the

majority of responses indicated the animal shows and facilitated learning through hands-on experience as the most influential. Other responses indicated speaking and listening to volunteers, animal display and signage, behind-the-scenes opportunities, special events and the marketing department's efforts in creating different themes to draw the public to the facility. Finally, all eight volunteers unanimously felt that their position within the Aquarium as volunteers contributes to educating visitors.

Having asked the volunteers what the Aquarium contributes to their lives, half of the participants said self-learning served as a major role in their lives (VA: 3, 7, 6, 8). Along with self-learning, the Aquarium provides opportunities for socialization (VA: 2, 3) and enjoyment amongst the volunteers (VA: 1, 2, 5). One participant said time spent volunteering at the Aquarium led to a deeper care and concern for animal conservation and helped with their confidence.

For me it made a huge difference in who I am even. I care a lot more about animal conservation now than I did when I started. It changed my ability to speak in front of people... and now I have a job where I stand in front of 80 people on a daily basis and I talk. So it's definitely changed me in really positive ways. I learn a lot. I learn something new every time I'm there. Just little facts sometimes or how to relate to a certain group of people that I don't normally hang out with, which is really, really cool in itself. (VA: 8)

Additionally, the Aquarium offers two participants an outlet to make a contribution to their personal interests and passion for wildlife conservation (VA: 4, 7) and another two volunteers consider the Aquarium to be a positive reference to have for future employment opportunities (VA: 3, 6).

Regarding the Aquarium's role in the lives of visitors, five of the volunteers said entertainment is the main role (VA: 1, 2, 3, 5, 7). Another role the Aquarium fulfills for visitors is as a family place (VA: 1, 6, 8) and as a place to learn and enhance lives (VA: 1, 4, 6). As one

volunteer says, “I believe very strongly that animals can act as ambassadors for their species. If they are threatened and endangered they become a vehicle for people to be aware that we have to take care of these guys and the environment that they are in” (VA: 1). The Aquarium as a tourist attraction and source of entertainment is what the participants believe to be the Aquarium’s role in city life, and many participants believe this role to be positive for various reasons. As a tourist attraction, the Aquarium brings in financial resources for the economy (VA: 8), provides employment (VA: 7) and establishes connections within the city itself (VA: 6). For instance, the Ocean Wise program as a resource for local restaurants. It is also a source of pride for Vancouverites. “I think the Vancouver Aquarium is kind of the crown jewel of tourism in Vancouver” (VA: 5). The Aquarium also connects citizens to nature outside of the city without ever having to leave it (VA: 4). As one volunteer notes, “Visitors to the Aquarium are enriched in many ways educationally, both with local and global species” and goes on to add, “The importance of marine life in our daily lives is often overlooked” (VA: 7). Another volunteer offers, “So much of this vulnerable and valuable beautiful coastline is thousands of kilometers. That you can just go to the Aquarium and get a sense of everything that means or a little sample or a glimpse” (VA: 4).

Visitor perceptions of the Aquarium according to the participants are predominately positive. Differing visitor views noted by the participants include the Aquarium as a place for people to view animal and plant species not native to their country of origin. As well, one volunteer mentioned while the majority of visitors leave with a positive outlook of the Aquarium, some visitors are disappointed by the animal shows (VA: 8). In particular the expectation for the dolphin show from visitors is to be a spectacle, instead it is more educationally driven. The greatest source of contention involving visitor perceptions and the Aquarium is the issue

surrounding the captivity of cetaceans (whales, dolphins, and porpoises). As noted by one volunteer,

[S]ome [people] look at the Aquarium as a place where animals are kept prisoners and they shouldn't be. Especially with marine mammals, I don't know why people have a DNA hierarchy of which animals should be in captivity or not. I can see some functional reasons in terms of spaces occupied and the types of animals they are. I can understand a lot of cases and I like to have good discussions on them. In the best of all worlds we wouldn't need to keep animals in captivity but we're not there yet... (VA: 1)

Finally, one volunteer suggests that while visitors may view the Aquarium as a venue for entertainment, the belief is that these people can feel good about their visit because the Aquarium is a not-for-profit organization (VA: 3).

Inquiring into whether or not the participants perceptions of the Aquarium changed after becoming a volunteer, every one said their perceptions changed in one form or another. All of the responses indicated deeper learning occurred from their time at the Aquarium. This learning includes understanding how the Aquarium functions through its conservation efforts and research, to becoming more impressed with the dedication of staff and other volunteers within the facility. Three volunteers commented on the respect they gained for the facility since becoming a volunteer, particularly in regards to the Aquarium's transparency and support for self-learning. "There are no guidelines about what you can or cannot talk about or what we do or do not disagree with, which I think is really great and says a lot about an institution. To say that we should be completely honest about our experiences, gives me a lot more faith about their basis for the whole thing [mandate] " (VA: 3).

To expand on the previous question, when asked if any additional actions have been taken beyond volunteering since becoming involved with the Aquarium, half of the participants said "yes," (VA: 2, 3, 5, 8) three said "no" (VA: 1, 4, 7) and one volunteer gave no clear

indication one way or the other. The participants who replied “yes,” said they have taken additional actions beyond volunteering at the Aquarium and indicated they shared information learned about the Aquarium, animal rescue, and local efforts supported by and facilitated by the Aquarium (VA: 2, 3, 5, 8). Other actions include composting (VA: 3, 5), waste and water reduction, energy saving, and dining at Ocean Wise certified restaurants (VA: 3). One participant indicated that while volunteering at the Aquarium did not influence personal habits and conservation behaviour, time spent volunteering has led to the creation of a gardening manual for the Amazon Gallery. The purpose of this unofficial manual is for future gardening volunteers in the Gallery to use as a reference for answers to how the drainage system works, how the irrigation is set up, and a guide to toxic and non-toxic plants. The inspiration for this manual came from the individual’s passion for plants and the importance of “educating the Aquarium on good composting and good soil aeration” (VA: 7). “Horticulture is an environmental support for zoos and aquariums. Plants are just as integral for forage, for clean air... plants are supportive (VA: 7).

In summary, interviews with the volunteers at the Vancouver Aquarium, similar to the interviews with the Calgary and Toronto Zoo volunteers, uncovered a much more robust and informative set of findings compared to the social media analysis which contributes to the core findings of this thesis and is analyzed in Chapter Seven.

6.3 Summary

This chapter examined the results of the official Facebook pages of three accredited Canadian zoos and one accredited Canadian aquarium. The vast majority of screen shot comments from all the zoos consistently emphasized entertainment (2442) with a very small but notable number

(118) mentioning themes of education and conservation.

Comments reflecting pure entertainment centered on adjectives mainly describing the animals (“cute,” “adorable,” “beautiful”) or anthropomorphizing the animals (e.g. “They look happy”). Comments and posts conveying environmental education learning occurred across all four zoos (57). The largest number of comments came from the Calgary Zoo (36). The majority of these comments from the Calgary Zoo were directed at the volunteers and staff on-site, with information booths set up for the partial re-opening of the Zoo after the flood in June 2013. Other environmental education related comments came from visitors who mentioned having spoken with a keeper and learning about an animal in their care (Toronto Zoo). The remainder of comments were from visitors responding to posts by the zoos with responses indicating that they were not previously aware of the information shared.

Observations of comments identifying conservation initiatives either on or off-site involving the four zoos equated to 8 screen shots with the Calgary Zoo displaying half of the total (4). The visitor comments relating to conservation initiatives all relate to posts made by the zoos about breeding programs (Species Survival Plan) or rescue efforts of the zoos (e.g. Vancouver Aquarium’s Marine Mammal Rescue Centre). The responses relay having not been aware the zoo was involved in national and international efforts to rehabilitate particular threatened and/or endangered animal populations.

Lastly, 53 screen shots displayed actions suggesting stewardship amongst visitors beyond imparted knowledge gained. The Calgary Zoo presented the greatest number of comments for this category (30). For all four of the zoos the most common form of action indicated was through donations. Visitors, philanthropists, organizations or sponsors in support of the zoo made donations. The bulk of donations and external fundraises made to the Calgary Zoo

transpired following the flood with efforts to rebuild the Zoo. Additional actions included participating in community cleanup efforts (Great Canadian Shoreline Cleanup), online voting for grant contests zoos are involved in (Shell FuellingChange) and conservation efforts by local school groups on and off-site with assistance from the Zoo (e.g. Atlantic salmon fry release).

Despite entertainment comments dominating the social media data from the zoos' Facebook pages, a portion of responses indicated themes of education and conservation related to the zoos. These posts could facilitate the second phase of Kolb's learning cycle: Observation and Reflection. Facebook could be acting as a forum for visitors to reflect on their own experiences at the zoos, and post about them. Conversely, the output from the zoos could also encourage visitors to reflect on their zoo experience and how it relates to education and conservation.

With respect to the results from the volunteer interviews, the zoos educated and influenced to some degree the vast majority of participants. All participants from the three zoos volunteer because of a passion for animals and the environment, the desire to share and teach others about nature, or a need for continued self-learning. The most common way in which participants learned about volunteering opportunities at the zoos is through their visits and seeing other volunteers and/or information on-site. While the scope of activities varied within each zoo, some seasonal, others year-round positions, there were recurring themes for why the participants engage in their activities. The most repeated themes being: enjoyment, sharing of information and knowledge, interacting with the public, and contributing to the community in a positive way. Every participant believed animal conservation to be of importance and, as a result, recognize accredited zoos as important in promoting animal conservation. However, not every participant from each zoo felt that accredited zoos and aquariums rank higher than other conservation facilities or initiatives. The rationale identified by participants was that each conservation facility

or initiative plays a role and is dependent on each situation.

When asked if each zoo can fulfill its mandate, all responses were “yes” they are achieving, or are on their way with financial resources being the limiting factor barring them from meeting their goals. The principal response given to why zoos are important across all three case studies is for education and raising public awareness on endangered species and the environment. According to the participants, zoos are also places where research, conservation efforts, and authentic and high standards are met with the display of animals acting as ambassadors for their species.

All but two of the participants agreed that zoos provide learning opportunities for visitors. One of the two participants responded that learning opportunities provided for visitors from accredited zoos “depends on the setup of the zoo” (TZ: 7). The volunteer went on to say,

I know some places where you come in the front doors and depend[ing] on the number of people who come in there are lecture rooms and videos and other things [where] people can sit and watch. Or maybe halfway through the zoo there is a spot where they might want to do that, but this Zoo has volunteers. The range and ability of the volunteers varies. So not all volunteers may come with the notion they need to actively educate the public, and I think that could be a bit of a drawback. Yes it’s lovely to have lovely people greeting visitors but if you really want to educate them [the public] you need to have that special group that says ‘yes, my mission is to educate the visitor that comes in about whatever exhibit and be proactive.’ (TZ: 7)

The second participant commented that “while they [zoos] should definitely [provide learning opportunities] I don’t know if that’s a part of what they have to do in order to be accredited or not but maybe it should be part of their list” (TZ: 12).

Of the several different ways in which zoos offer opportunities to learn, the most popular response was engagement with volunteers, which includes interactions with touchable displays, props, and biofacts. The same response was given when asked what zoos do to allow for the

most successful learning opportunities to reach visitors. Speaking to a volunteer and engaging on a one-on-one experience with hands-on opportunities at interpretive displays involving biofacts was the highest recurring response. Personal experience through what participants see and hear from others and during their time as a volunteer is the primary indicator used to determine if zoos are successful in supporting public education. Accordingly, every volunteer from each zoo felt that their role as a volunteer contributed to educating visitors.

Time spent as a volunteer at each zoo played a different role in the lives of the participants. However, the prevailing role each zoo plays in the lives of volunteers is as a form of enjoyment for various reasons including socializing with the public, other volunteers and staff, and supporting a passion for wildlife. The strongest response as to what each zoo's role was in the lives of visitors was as an entertainment attraction to the general public. Similarly, when asked what role the case studies played in city life, the dominant answer again was as a source for tourism and to serve as an attraction site within the city. Nonetheless, each zoo was mentioned, on multiple occasions, as a place to build connections and generate exposure to animals and nature that people, particularly inner-city children, would otherwise never experience.

Visitor perceptions, as described by the volunteers, were considered to be mainly positive. The greater part of volunteer perceptions of each zoo changed as participants developed a greater awareness and deeper understanding of the conservation, research and education initiatives the zoos and aquarium are involved in. Although volunteered time spent at each zoo changed participants perceptions and increased their awareness, the greater number of volunteers did not take additional actions to promote conservation beyond their positions at each institution. The next chapter will combine the research, both secondary and primary, in order to determine if

zoos can effectively contribute to conservation through educating the public and if they are successful.

7.0 Effective Zoo Educational Programming: Analysis, Integration and Recommendations for Changes

The primary findings of the previous chapter revealed some interesting results with respect to the zoos' conservation and education initiatives as well as their ability to effectively communicate with their intended audience. Chapters Two and Three set the stage for the primary field work with their focus on secondary literature that considered experiential environmental education approaches, and the efforts of zoos in fostering a conservation ethic and stewardship in their visitors. This chapter analyzes the findings from the secondary and primary research and considers their implications for the future of zoos, their environmental programming and their communications initiatives. The analysis is followed by recommendations for zoological institutions with respect to how they might further strengthen their outreach and communications to deepen societal understanding of the importance of wildlife and habitat conservation.

7.1 Analysis of Field Work

The study's field work involved a comparative analysis of the social media Facebook pages of four Canadian zoological institutions. Semi-structured interviews also were conducted with volunteers at The Calgary Zoo, the Toronto Zoo, and Vancouver Aquarium. The purpose of this primary research was to provide insight into the investigation of whether zoological institutions meet the conservation and environmental education mandates it strives to support.

a) Social Media

There are several possible hypotheses one could consider in the examination of the social media findings, which did not reveal any evidence that meaningful conservation education had taken

place during zoo visits. The information collected does, however, reveal several outcomes worth consideration. One explanation of why very little evidence of conservation education was found on the pages could be that social media pages, such as Facebook, are not effective forums for dealing with questions about conservation. Some forms of social media do not lend themselves to deep thinking, or deep questions and analysis. Facebook, as a medium, may lend itself more to superficial analysis and/or comments. It was not created for education but strictly communication. The function of social network sites such as Facebook, is “to maintain connections amongst people by providing a vast array of possibilities for self-presentation and managing a multiplicity of social contacts” (Marder, Joinson & Shankar, 2012, p. 859). Facebook is used to share information and communicate via messages, pictures, videos, and links without the barriers of physical locations; this does not necessarily mean that it is equipped to educate its users.

A second possibility could be that the social media pages utilized by zoological institutions were not designed to capture educational impacts. When each zoological institution established its Facebook page, the objective might not have been clear with respect to its intended purpose. It is possible that the designers of the pages were not necessarily looking to receive feedback on conservation education. Additionally, it may be that, as of yet, there is no communications link between departments in zoos. Primarily communications and public relations people may handle public communications while staff members are responsible for conservation and education. It is possible that those departments do not coordinate their efforts in order to extend the conservation message through the zoo’s social media. There were a few interviews across the country that gave the impression that communications between different departments could be strengthened to enhance the dissemination of the conservation message.

Internal politics within operations of zoological institutions could also play a role. For instance, one volunteer commented,

I think one thing here at this Zoo that we should do a better job with is to stress conservation. We do it in our workshops but we don't really do it in attempts to fundraise for the Zoo. The first and foremost thing is conservation, education and research. Basically the visitors here fund those efforts. (TZ: 6)

Another volunteer echoes this sentiment concerning a loss in feedback and disconnect –

I really appreciate what the Zoo does and I'm a really big fan but I'm tired of kind of manufacturing my own enthusiasm. I'd like to get feedback and then it would probably feed into my performance at the Zoo anyway because when I leave the Zoo I am always happy. It's a good thing to do [volunteer] and there are not many places like it. (CZ: 1)

Furthermore, a volunteer lamented,

I believe now that the Volunteer Education department at the Zoo is just an extension of Human Resources and the goal of Human Resources of course is to protect its employer. It's not about the people. It's not about helping the people, it's a resource - a human resource to make your company run well and that's what volunteers are now. I believe we are a commodity and we're not people anymore and that's sad. (CZ: 2)

A third possibility is that zoological institutions primarily entertain and do not foster conservation in visitors as indicated by comments from guests. For instance, a number of posts made by the zoological institutions were to encourage photo captions for the public featuring animals from the facility. Many of the comments to the photo captions and other posts reflected superficial responses such as “Tigers look happy in the shade” and “Our family visited last Thursday and had a great time. The new pandas are adorable!”

Another possibility may be a combination of the above hypotheses: namely that zoos both entertain and foster education. Zoological institutions are entertaining but that does not mean that education cannot be transpiring at the same time. For example, after the announcement of a newborn Masai giraffe at the Toronto Zoo a member of the public commented, “Today I

learned a giraffe gestational period is about 15 months... cool.” Another example is from the Calgary Zoo encouraging visitors to “rediscover Prehistoric Park.” Feedback from a visitor said, “... last week I went to see the dinos and had a good time. It was fun listening to the staff teach the crowd about dinos.”

The final hypothesis could be that zoological institutions do foster education but social media is not a useful way to assess it currently. For instance, a guest at the Vancouver Aquarium posted “Visiting the Vancouver Aquarium is absolutely amazing. All the different species of sea life and fish and mammals to see are awesome! It is both beautiful inside as well as outside. If you have a chance to go see it, then go. You won’t be sorry.” The case study found many other similar comments, which suggest entertainment, rather than education. However, learning could still have occurred for visitors even if their comments in social media do not reflect this outcome.

From the evidence gathered in this thesis, the findings revealed many comments about entertainment and very few reflecting conservation education. This indicates that while zoos may be actively engaging in conservation messaging, there is no evidence that it is happening as much as it seems to be entertaining. This finding suggests an outcome that is contradictory to the zoos’ mandates.

The social media analysis does not provide evidence that zoos are effectively educating people but it may be more indicative of a missed opportunity in the use of this popular medium, rather than a failed conservation mandate. In other words, as hypothesis two above would suggest, there is an opportunity here for social media to serve as a medium for fostering conservation education. Therefore, if zoos wish to persuade the public that they are not just about entertainment it is advisable for them to consider their methods of communications in a web-based era. This would be a worthwhile area for future research.

b) Semi-Structured Interviews

With respect to the semi-structured interviews, much can be learned from the zoological institutions' volunteers. From the interviews with the volunteers, the researcher was able to gather that these institutions do provide education and learning opportunities for the visiting public. As noted in Chapter One, this study examined what motivates zoo participants and considered if their behaviour changed towards conservation. The volunteers are visitors with the most demonstrated interest in zoos so it was worth investigating if their experiential education fostered changes in their own behaviour towards conservation — consistent with the deep learning approaches discussed in Chapter Two. Participants indicated that their continued satisfaction with volunteer experiences was tied to both altruistic (interpreting to visitors) and personal (learning about wildlife) motivations. Bixler et al. found similar results in a recent study of zoo volunteers at the Cleveland Metroparks Zoo in Ohio (2014). In particular, this study found “being actively involved in a conservation organization... amplifies, enriches, and focuses an existing interest in wildlife conservation among the volunteers” (Bixler et al., 2014, p. 71). From the primary study when asked why volunteers participate in zoo or aquarium activities the majority of the responses referenced opportunities for teaching others about wildlife as well as learning about wildlife themselves. One volunteer expressed,

I'm always interested in learning new things, different things, other perspectives and things like that. That's initially what got me into it was through selfish desires but it offered that opportunity to share that information so I think that's a really great thing to do... It's also giving. (TZ: 9)

Another zoo volunteer commented,

I like getting the public interested in whenever animal they are looking at in that particular spot and educating them on what the species is like or what dangers threatens

the species in the wild, why we breed them in captivity, [and] why zoos are important.

Some people have a problem with zoos and they don't understand why it's so important for us to have our breeding programs. (TZ: 16)

Volunteers were well educated about conservation and were able to name many local and global initiatives and organizations, which encourage wildlife conservation. Almost all of the volunteers confirmed that as a result of their education at the zoo they were able to undertake further conservation practices, including a willingness to commit more of their time to spreading the conservation messages of accredited zoos. Participants perceptions of zoos relating to their role beyond entertainment were altered after becoming a volunteer. For instance, one participant revealed,

I had no idea the caliber of the scientists they [zoos] employ and the commitment of the keepers to the work that they do. Learning about Species Survival Plans and their commitment to education and as much outreach as they did, and working as closely with the Board of Education as they did. I didn't realize there are so many activities and connections with the schools and the Girl Guides and the other things (e.g. Zoo Camps). (TZ: 4)

Another disclosed, "I think in everyday conversation [it's important] to explain to people [that] things like pipelines have consequences. Money [as] the bottom line is not what we need to be considering the most" (CZ: 6). A volunteer from Vancouver reflected,

I didn't know about all the initiatives that they [the aquarium] have and all the efforts that they are making to make a difference in any way that they can... I think more of them now than before becoming a volunteer. (VA: 6)

In addition, when queried about the learning impact of the zoo on visitors, the volunteers offered many examples and confirmed that indeed, there were numerous conservation education opportunities and efforts occurring both on and off-site. As noted by a Vancouver Aquarium volunteer with regards to learning opportunities, "They keep things interesting..." (VA: 6). As a summary of zoos as environments for learning, a Calgary Zoo volunteer offered,

You've got to capture the link between the person, their emotions and an animal... I

don't know who else would do it if it weren't for zoos... There's something different about... proximity to an animal and most people are not going to be travelling to where the [animal] lives. (CZ: 6)

Volunteers highlight the many unique ways that zoos can contribute to environmental education and foster stewardship among its visitors, such as using the presence of the animals to create a direct link between the actions of the visitor and the consequences for the environment.

c) Personal Observation

As the researcher of this project, I have eight years of experience as a seasonal education staff member beginning in 2008, as well as and five years of experience as a part-time education employee of the Toronto Zoo. As an employee, I have worked with the public, facilitating programs for visitors during the year including camps and public programs for families and children. In addition, I have worked with youth aged six to sixteen as a Zoo Camp counsellor.

During this time I have lead on-site tours delivering information on topics relating to the Zoo's efforts on the preservation of habitats and the conservation of local and global wildlife. The most impactful opportunity for learning from my employed experience was through Zoo Camp. As noted by a Toronto Zoo volunteer, "When my children went to high school and [were] doing high school biology, they knew most of the curriculum stuff because they learned it at Zoo Camp" (TZ: 8). As a child I attended Zoo Camp as a camper for almost a decade. These experiences helped to foster my love of nature and animals and motivated me to pursue academia in environmental studies. Zoo Camp themes are rooted in the biological sciences, but are tailored to different age groups. Introductions to animals and nature are offered to the youngest age group (Zoo Kids, 4-5) while the oldest ages (Discoverers, 11-12; Bio Camp, 13-16) investigate topics

about what zoos are doing to conserve wildlife and protect biodiversity, to learning about the numerous careers that keep a zoo in operation.

Camp-wide efforts to promote stewardship and influence positive behaviours were also prevalent during my time as a counsellor. Examples included cell phone and battery recycling challenges, encouragement of litterless lunches, and the sale of silicone wristbands with a portion of the proceeds going to Polar Bear International. These efforts prompted discussions and encouraged campers to think about the long-term impacts of their day-to-day activities and how they effect change beyond their own environment has proven to be influential. Parents of campers have approached me expressing their surprise by the knowledge shared by their children after camp, including matters pertaining to animal conservation and ways in which they can help bring about positive change to the environment.

Family programs and evening programs also inspire learning for adults. Often during a panda-themed overnight program, the adults were equally as keen as the children to learn about the giant panda. Many adults visiting the Zoo stop to listen along with the campers as counsellors teach their group about a particular animal and its habitat when on a tour around the Zoo site. I also have noticed many families and couples pausing to listen to and speak with the volunteers at the interpretive touch tables.

Beyond deliberate planned programs for the public, the Toronto Zoo exercises sustainable environmental practices, many of which take the form of alternative energy sources. The public can see, and learn about, many of these initiatives during their visit. For instance, visitors can enjoy a hot or cold drink from a biodegradable cup while enjoying the geothermal exhibit for the lion-tailed macaques. Whether or not the public is acutely conscious of the efforts

made by the Toronto Zoo, the Zoo continues to adopt new conservation initiatives, including energy efficiencies and environmental management.

Additionally, the Toronto Zoo is situated in the Rouge Valley. This setting provides an immersive experience for a visitor to see local wildlife in between their sightings of species from all over the world. Both local and international guests have the opportunity to view plants and animals from other continents. Adults, and especially children, growing up in inner cities can come to the Toronto Zoo to see exotic animals but also have the chance to see local wildlife that may not otherwise be seen where they live. For example, during the overnights I have heard lions roaring and coyotes howling in the same night. Visitors can see a rhinoceros or a wild red fox and many other animals, for the first time, all in one place. This chance to encounter local and global wildlife is a rare opportunity, which may otherwise not exist outside of zoos. From my experience as an educator at the Toronto Zoo, zoos provide a captivating learning environment, which incorporates opportunities to engage in multisensory integration.

7.2 Comparative Analysis of Primary Research Results and the Literature

The secondary literature investigation did not uncover any decisive information that indicates whether or not zoos foster conservation. There were strong views on both sides. Some argue that zoos do not “educate visitors at a level that would be deemed meaningful and long-lasting” (Fennell, 2013, p. 1). As an undeniable source for tourism, Fennell contends zoos and aquariums “should not be viewed as a morally acceptable setting for ecotourism” (2013, p. 1). Rather, they function primarily as attractions for fun and entertainment (2013). As noted by the author, those who argue in favour of zoos for ecotourism cite conservation and education factors as justification for their continued existence (Fennell, 2013). Additionally, a number of

commentators suggest education is merely a guise for purposes of public relations (Williams, 2001). While “administrators might claim” the conservation-education factor as foundational to the zoo experience, evidence suggests entertainment and recreation are the predominant influences (Fennell, 2013, p. 5).

A 2007 study of six zoos in the UK by Balmford et al. revealed similar results to Mason’s 2007 survey of visitors at New Zealand’s Wellington Zoo. The study, which totalled 1340 adult visitors found no changes in knowledge scores among visitors arriving and departing the zoos researched (Balmford et al., 2007). The authors discuss, “We found very little evidence, in the zoos we sampled, of any measurable effect of a single informal visit on adults’ conservation knowledge, concern, or ability to do something useful” (Balmford et al., 2007, p. 133). This finding, along with Kellert’s discoveries of typical zoo visitors lack in environmental awareness, “suggests that educational programmes are not as successful as zoos would have the public believe” (Fennell, 2013, p. 4; Kellert, 1984). Furthermore, captive breeding programmes are disadvantaged due to high mortality rates after capture for the purpose of breeding in captivity (Lück & Jiang, 2007). Fennell and other theorists challenge conservation efforts of zoos arguing the success rate of reintroduced self-sufficient animals is far less than the number of animals released (less than 20 species of 120) (Catibog-Sinha, 2008; 2013). The limited success with captive breeding reintroductions “induces the public to believe that the zoo’s conservation efforts are successful” (Fennell, 2013, p. 4).

As previously discussed, during the last half-century many positive changes in animal welfare have taken place in zoos (Chapter Two). Despite changes to nutrition, exhibit design, and greater knowledge of animal behaviour and physical health, it should be noted that there are no uniform standards of animal welfare conditions in zoos (Tribe, 2004). Even though “WAZA

offers accreditation to institutions where animal welfare standards are met, the standards that they promote are merely recommendations on the proper treatment of animals” (Fennell, p. 6). Continued debate surrounds these standards as they are suggested with varied opinions and assumptions about species management as to what constitutes best practice (Maple, 2007). One example, which is a continual source of controversy, is keeping cetaceans in captivity. A Canadian Senate bill is proposing a ban on cetaceans in marine parks, which if passed, would affect operations at the Vancouver Aquarium (Canadian Broadcasting Corporation, 2015).

Arguments, however, also are plentiful with respect to the positive conservation role played by zoos. Accredited zoos have demonstrated that they also contribute positively to conservation efforts with both education and breeding programs. For instance, a recent study of 10 zoos and 5 aquariums in the USA suggests zoos appear “to present a supportive social context” for climate change (Clayton, 2013, p. 460). The authors comment, “Results show that a sense of connection to animals or nature in the zoo is related to attitudinal and behavioural responses to climate change” (Clayton et al., 2013, p. 472). In the zoos examined, volunteers expressed similar sentiments regarding the positive conservation role played by zoos.

Captive breeding programs in zoos help in the long-term preservation of threatened and endangered species. Many programs are aimed at population recovery and reintroduction. One example of a successful conservation case is the Vancouver Island marmot. The wild population of this endemic species dwindled to 30 individuals in 2003, making it North America’s most endangered mammal (Association of Zoos and Aquariums, 2011). The Toronto Zoo and Calgary Zoo became involved with the captive breeding and reintroduction of the species along with Mountain View Conservation Society and the Tony Barrett Mount Washington Marmot Breeding Centre (Association of Zoos and Aquariums, 2011). Since the first reintroduction to the

wild in 2003, the Vancouver Island marmot has made a significant recovery with an estimated wild population at 300-350 individuals (Association of Zoos and Aquariums, 2011). This collaborative effort was responsible for preventing this critically endangered species from extinction. These reintroduction efforts were made possible by the continually improving care available for animals at zoos.

The field of animal care and research has benefitted as zoos have evolved. Improvements in animal husbandry and zoological medicine have contributed to increased longevity of animals in captivity. The incorporation of environmental (behavioural) enrichment is integral to daily animal care and is described as “an improvement in the biological functioning of captive animals resulting from modification to their environment” (Newberry, 1995, p. 230). The quality of life of animals can be dramatically improved through the identification of targeted criteria such as physical and social needs of an animal, human caretaker-animal interaction, and diet (Mellen & Sevenich MacPhee, 2001). The consideration of multiple components incorporated in environmental enrichment “may influence its well-being” (Mellen & Sevenich MacPhee, 2001, p. 214). For instance, “reproductive success can be influenced by social environment and level of keeper interactions” (Mellen, 1991; Mellen & Sevenich MacPhee, 2001, p. 214). Reducing an animal's stress through on-going enrichment research is paramount to captive population management and ensuring success in the reproduction of endangered species. Enrichment programs afford “animals control over their environment and often provide them with choices of different activities in which to engage” (Bekoff, 2007, p. 93). However, even in the “best of enriched environments,” there are limitations to behavioural choices for animals in zoos (Bekoff, 2007, p. 93). Therefore, professor of ecology and evolutionary biology, Marc Bekoff argues “much enrichment is really designed for the human visitors’ enjoyment, since enriched

environments typically do not resemble the natural environment of the caged animals” (2007, p. 93).

From the secondary literature, it is unclear whether a conservation message is reaching visitors. From the primary research discussed above, the social media analysis did not reveal any information about conservation. The semi-structured interviews with the volunteers and my own personal observations, however, suggest that, in fact, there are a lot of initiatives taking place that are having an educational impact towards conservation. However, both those sources of information are not external to the zoos themselves and, as such, could contain a bias. Therefore, as the researcher, I sought out a qualified, internationally known wildlife biologist to ask her opinion about the role of zoos with respect to conservation.

Dr. Anne Dagg is not employed by a zoo and is less predisposed towards defending them. She has wildlife experience and understands the value of animals roaming freely in a natural habitat. Her passion for giraffe influenced her research. Travelling to South Africa alone, Dr. Anne Dagg became the first person to study the species in the wild beginning in 1956 (University of Waterloo, 2014). Since this time Dr. Dagg has written several books on topics ranging from zoology and animal behaviour to feminism (University of Waterloo, 2014). In 2014, the first World Giraffe Day was celebrated on June 21 and honoured Dr. Anne Dagg for her pioneering work (University of Waterloo, 2014).

The following interview with Dr. Dagg was held in person at the University of Waterloo on January 28, 2015. Dr. Dagg revealed, “I saw my first giraffe at age three I think and fell in love with them. So I wanted to carry on with them and have all my life.” Concerning the relevance and ranking of accredited zoos in today’s world, Dagg states: “I don’t want to put them at the very top because there is a problem with them of course, but without them I think it

wouldn't be any better off – it would be worse off.” When asked if zoos can effectively carry out their conservation mandates, Dagg notes, “Well they can try, but it's really hard to know... Some zoos have exhibits on the conservation of species... and if that's the case, you hope that it rubs off.” When asked what accredited zoos could do, if anything, to better their position in conservation through environmental education, Dagg suggests displaying signage about species conservation status in the wild (IUCN Red List). “To my mind that's really important because if you don't see that you really have no idea. It's just another animal at the zoo and you don't think much about it.” Zoos could even go further, and indicate how visitors can support conservation initiatives for each animal on the signage indicating their conservation status.

Furthermore, she suggests that signage should not just educate children but also adults, on a more sophisticated level to make zoos relevant to adults. “Many species are incredibly complicated...” and the sharing of ‘childish’ facts that adults find fascinating and appealing to encourage their interest is peaked alongside their children's. Finally, Dagg stated:

I think it's really super to have people looking professional who can say what they [the animals] eat, etc. I mean there would be a lot of teenagers who would love to do that. I think that would be a huge resource as long as they were keen and knew what they were talking about.

In Dagg's opinion, the most important factor to determine if a zoo is successful in environmental education towards conservation is the connection between the public, specifically children, and the zoo representatives. These representatives could be animal care staff, education staff, volunteers, etc. She explains, “I think I'd want to go there and see children around and people talking to them... I think that's the sort of thing that makes the huge difference for a child [where] they really were in contact with somebody.”

When asked if zoos play an important role in supporting wild spaces and promoting the conservation attitudes of people in cities, and if that is important, Dagg remarks,

I think it's hugely important because to say they're taking them [animals] out of the wild I would say that doesn't really happen too much anymore so that's really not a problem. And of course you really can't start killing them all off and shutting down the zoos. So I think it's really important what [role] they play especially when they have these signs up saying there is only [x] number of giraffe in the wild. If things do go wrong in the wild then we have some in captivity so we're keeping the gene pool alive. That serves a bottom line and you hope that'll never happen, but it could have happened [e.g. African elephants].

As an individual who has spent time on wildlife reserves herself and worked with others on reserves, Dagg was asked if the people operating wildlife reserves would favour accredited zoos spreading the message on endangered species' conservation status in the wild. Dagg replied, "I think so. Anything to get the word out that these animals are in real danger."

Renowned primatologist Dr. Jane Goodall holds a similar point of view and was quoted as saying, "Zoos have greatly improved during my lifetime. WAZA affiliated zoos and aquariums educate hundreds and thousands of people around the world and, increasingly, are playing an important role in the conservation of species" (2012). Further, in an interview, Dr. Goodall stated she believes zoos to sometimes be a better alternative than the wild (2011). Speaking specifically about the endangered chimpanzee, she mentions how some animal rights people cannot "get their minds around" the fact that people need to think about what the animal would prefer (2011). Dr. Goodall goes on to state how sometimes the "best choices may be to be in a secure place in the wild, or a really good zoo. None of the other options are really of any use. This kind of idea that any kind of wild is always good is not right" (2011).

Finally, English broadcaster and naturalist Sir David Attenborough, presents his views on zoos. When asked in an interview if he is tempted to visit zoos given his extensive travel experience, he replied,

I used to go to zoos a lot. After all, the first series I ever did called *Zoo Quest* was about capturing animals for zoos. Things have changed since then but I still think that zoos are very important – they function in conservation, education and scientific research, which are all absolutely admirable provided the zoo is properly maintained and the animals live in the proper circumstances. If they are breeding, you don't need to capture wild animals to restock. But I don't actually enjoy seeing birds in cages and I don't enjoy watching monkeys in sterile environments so I don't go. But I do not disapprove of zoos. (2008)

In addition to investigating the views of these respected figures in the scientific community, the burgeoning field of citizen science was explored to see if there was any other external evidence of the role zoos play in conservation. A review of the actual programs being offered beyond zoos, namely such initiatives with both post-secondary universities and citizen science, did reveal examples demonstrating the importance of the zoos from a conservation perspective. This external information verified the assertions made by the zoos themselves.

A study by Utah State University claims “herpetology as a field stands... to benefit greatly from contributions by citizen scientists” (O'Donnell & Durso, 2014, p. 151). O'Donnell and Durso contend that the major advantage a citizen science database delivers over that of professional herpetologists is “the great statistical power that is achieved from the accumulated efforts of thousands of volunteers” (2014, p. 151). FrogWatch Canada, and Frogwatch Ontario, which is part of the national initiative governed by Environment Canada is an example of a herpetological database, which provides citizen scientists opportunities to identify, record, and submit observations online (Toronto Zoo, 2015). This information helps scientists increase their

knowledge of amphibians in Canada. Frogwatch Ontario alone has observed a total of 15,494 sightings from 1999 to 2014 (Toronto Zoo, 2015).

Another citizen science project involving multiple partnerships is Zooniverse. Zooniverse is the world's largest citizen science online portal (Penguin Watch, 2015). A Zooniverse project known as the Penguin Watch project allows people to “spy on penguin families for science” (University of Oxford, 2014). By tagging images of penguin adults, chicks, and eggs from nesting sites in Antarctica, members of the public can help scientists understand why some penguin colonies are growing and others are decreasing (University of Oxford, 2014). Since the project went live in September 2014, within its first four hours, citizen scientists had labelled more photos than the researcher team had in five years (British Broadcasting Corporation, 2014). The Calgary Zoo takes part in providing funding for the Penguin Watch project along with several other organizations such as the University of Oxford (UK), Stony Brook University (USA), and the British Antarctic Survey (Penguin Watch, 2015).

To summarize this section, “nature protection is no longer solely considered as set apart from human activities... or restricted to emblematic or rare species, or the subject of pure academia” (Devictor, Whittaker & Beltrame, 2010, p. 360). As such, these conservation activities and opportunities for environmental stewardship are impacting the protection of species through awareness and action through facilitated citizen science efforts. Zoos are definitely changing their mandates and are investing considerable amounts of money into conservation initiatives (citizen science and outreach) that are having an impact. However, for zoos to be seen by the majority of the general public as more than entertainment facilities, more could be done.

7.3 Implications of Research for Zoos and Recommendations to Zoos for Strengthening Outreach and Conservation Education

As noted in Chapter Two, deep learning and authentic learning in environmental education all require experiential forms of education. Zoos are certainly now pursuing those approaches throughout their facilities with efforts such as Zoo Camps, and also through citizen science. For zoos to have a greater impact towards conservation, that kind of effort could be strengthened. Three main areas to enhance the education and communications message about conservation involve: a) learning experiences in zoos b) social media usage and c) effective utilization of the efforts of the volunteers.

Enhancing authentic and deep learning initiatives within zoos is attainable. Opportunities for deep learning would be best achieved through immersive experiences such as on-site overnight or weeklong camp programs. According to Walter, zoos are categorized as “practical expressions” of the liberal tradition, along with other examples such as museums of natural history and botanical gardens (Walter, 2013, p. 9). With the shift in conservation and education priorities by zoos within the last half-century and the emphasis placed on environmental education programs, zoos are moving into the progressive tradition. The progressive tradition can be supported by Zoo Camps, which serve as opportunities for experiential and authentic learning to occur. Within a zoo setting, the role of the counsellor as “teacher as the source of knowledge and authority” to “teacher as guide [and] facilitator” can be effortlessly transitioned (Walter, 2013, p. 5). For instance, campers can participate in problem-solving scenario activities. For example, in one activity, a hypothetical animal is presented with several physiological and behavioural requirements needed to care for it. Campers then need to come up with an exhibit design and animal care routine to adequately meet the needs of the animal. Zoo School, weekend, and youth badge workshop programs can implement similar activities. Children attending Zoo

Camp often return to camp year after year. I have personally experienced growing up with the Toronto Zoo and having its animals close by, and attending Zoo Camp for a number of years. This process of exposure to wildlife, both local and exotic, resonates with children and over time becomes a long-term investment in people spreading the conservation message about wild animals and habitat.

As previously discussed, experiential learning opportunities can encourage deep learning. Occasions for engaging in learning involving practical hands-on experiences and the application of information to real-world examples can support authentic learning (Lombardi, 2007; Reeves, Herrington & Oliver, 2002). Exploration-based or play-based learning in Parent and Tot programmes (ages 2-4) provide hands-on activities for young children. Experiencing open-ended play is “important for young children because it provides opportunities for exploration and discovery, which are necessary for supporting learning” (Cutter-Mackenzie & Edwards, 2013, p. 197; White et al., 2007). Open-ended play provides children with materials where “minimal engagement and interactions allows them to examine and explore...” (Cutter-Mackenzie & Edwards, 2013, p. 198). With little or no discussion or instructions, children participate in playing with natural materials (e.g. sticks and rocks) incorporated into the activities (Kusiak, personal observation; 2015).

Zoo overnight programs give visitors – both children and adults – the chance to experience a unique occasion to participate in interactive activities, behind-the-scenes and animal encounters. Zoos would benefit in offering different programs such as themed overnights, adult overnights, and overnights for teenagers. While family overnights deliver special opportunities for participants, age-appropriate theme-based programs designed for small groups can potentially foster emotional connections in a more intimate setting.

The use of biofacts at interpretive stations provides interactive opportunities for volunteers to present information to guests. However, not all visitors engage with the volunteers. While interpretive stations and biofacts should continue to be utilized at zoos it can be a challenge to keep the interpretive material in tune with displays and exhibits. With today's technology evolving quickly, and the growing use of electronic and digital displays, the incorporation of new technologies could enhance the visitor experience and complement volunteer interpretive stations. Electronic displays such as touchscreens in zoos would provide an interactive experience for the visitor. Digitized visual displays can provide information that allows people to interact with the display by raising questions or addressing certain questions of interest. For example, if the visitor wanted to learn more about an animal's habitat or about the evolution of a species, they would only need to tap the screen to learn more about a particular topic. A volunteer at the Vancouver Aquarium observed how many displays at the Aquarium, offers a potential lesson in geography in a world where a lot of people don't seem to know where we are or [where] other places are. Interpretation with a map to show where... creatures live is important and often lacks geographical information [relating to animal habitats]. (VA: 1)

The benefit to these displays is the convenience in readily updating information electronically and the openings for highlighting conservation issues can be easily linked in the presented material. "The adjustment would be people's time rather than actual money making a display" (VA: 1).

One suggestion to strengthen the use of social media towards conservation would be to strengthen the communications efforts internally between departments to ensure that the conservation message is being consistently reinforced. For example, collaboration could be fostered between people who are involved in education, the volunteers, marketing and guest

services departments. Other researchers have also noted that zoo and aquarium websites indicated a greater emphasis on entertainment over conservation (Carr & Cohen, 2011). The social media pages of zoos could reflect their conservation mission statements explicitly. Zoos could display their conservation certifications and achievements prominently while appealing to the public. For instance, any of the social media pages could post a picture or video of an animal interacting with an enrichment device provided by Zoo Camp participants and include a caption explaining a) what enrichment is and why it is important, and b) promote and advertise for Zoo Camp at the same time. Conservation messages could be actively promoted through social media. Facebook posts with photo captions could highlight animals that are part of conservation initiatives and Species Survival Plans.

Zoos should continue to conduct visitor surveys with feedback on conservation education. In a survey from the Toronto Zoo in 2014, visitors rated the Zoo as a conservation education facility, with an average score of 4.57 out of 5 points (with 5 being strongly agree and 1 being strongly disagree) (Toronto Zoo, 2015). The survey results also found volunteer helpfulness was highly ranked with 4.74/5 (Toronto Zoo, 2015). “Volunteer helpfulness” was only captured in the survey as a vague attribute. Such a category could reflect helpfulness at wayfinding stations or helpfulness in providing animal facts at an interpretive station or at an exhibit. Less general questions would be much more illuminating. While visitors are questioned about what areas of the Zoo they attended during their visit, more specific questions could be asked about whether or not they stopped at an interpretive station to offer a more in depth indication of on-site conservation education. This information would be helpful to the volunteers as some volunteers identified limited feedback in performance as a concern during the interviews.

Another way of targeting a larger audience for survey results is to offer online surveys in addition to on-site surveys. These can be offered through the zoo's website or Facebook page. If zoos are interested in determining their impact on young people, social media is the approach in which they need to communicate, not just through park surveys. Incentives such as free or discounted admissions could be offered to better the chances of visitor participation. Similar incentives can be awarded through social media and Facebook contests to engage the public in participating in conservation oriented themes. For instance, prizes can be won for writing contests about what visitors learned during their trip to the zoo or filling out a conservation education-based quiz.

Volunteers could be both empowered and their role enhanced with great benefit to the zoo and at little cost. One volunteer suggests zoos should, if they do not already, have Zoo Ambassadors available year-round to speak with the public, and in particular, connect to the younger audiences visiting the site (TZ: 3). Young adults may feel more comfortable approaching an individual closer in age to themselves as opposed to an adult volunteer. With respect to adult visitors, a Toronto Zoo volunteer observed that there is little information available for adult learning (TZ: 13). The volunteer suggests making new ways to approach adults such as creating reproductive themed touch tables to highlight the work that occurs in the Toronto Zoo's Reproductive Physiology unit, noting "adults want to be intrigued and to learn" (TZ: 13). Along the same lines, a volunteer at the Vancouver Aquarium says,

I think it's the adults that get more out of [programs]... I have had more success in dealing with adults or older kids. Adults of all ages will thank you for it and in fact say I didn't know any of that, thank you for telling me. (TZ: 12)

Zoos are international organizations and tourist attractions appealing to visitors from all over the world. English language barriers and cultural differences can be detracting and limiting

factors to the visitor experience. One volunteer expressed concern over this issue questioning how can the conservation education message reach everyone? (TZ: 7). A suggestion would be to also recruit applicants that can speak diverse languages. Another issue raised by TZ: 7 involves the inclusion and integration of First Nations groups. While the Toronto Zoo does partner with First Nations communities through off-site conservation initiatives, the volunteer suggested highlighting and bringing awareness to a First Nations day to allow First Nations to celebrate at the Zoo (TZ: 7). This could be extended further by enhancing signage to include information about the connections between animals at the zoo and their role in the culture of First Nations communities.

Strengthening citizen science and outreach is imperative for the continued progress of zoos towards achieving their conservation mandates. One concern with citizen science is the reliability of data generated by volunteers as opposed to professional researchers. U.S. National Park Service ecologist Brian Mitchell believes that volunteers have this ability given the proper time and training provided by professionals (Cohn, 2008). A mammal survey was conducted by the National Zoo's Conservation and Research Center in Front Royal Virginia in conjunction with "a larger research effort by government agencies, universities, conservation groups, and individual scientists..." (Cohn, 2008, p. 192). Wildlife ecology, William McShea, invested time into explaining the purpose and goals of the mammal survey and demonstrated how to use the equipment and the follow-up necessary for the study (Cohn, 2008). Understanding this, one suggestion for zoos to expand their citizen science programs is to offer courses on citizen science to adults and provide workshops in advance for upcoming studies. Mini or mock citizen science projects can be made into activities for workshop programs or in camp. For instance, at the Toronto Zoo campers can participate in a game of 'BioBlitz Bingo' to find evidence of different

species on-site and record them. This activity would be relevant in making connections to what the Zoo actively participates in on a larger scale during its annual BioBlitz.

One participant provided a suggestion for education outreach across zoos. When asked how accredited zoological institutions provide learning opportunities for visitors, a volunteer proposed collaborative efforts across accredited zoos and aquariums.

Why can't zoos coordinate and work together to come up with information? We can all [learn] from [each] other and come up with a common way of doing it [educating the public]. Once you do it then you can come up with different ways and improve it at your zoo. We can all get together and come up with creative ideas, bring in tech experts then you have the funding. Then you get everyone together and do it and say we're all there, [let's] do it together. If we try to do it ourselves we don't have the people [and] we don't have the money. (TZ: 2)

Regarding issues in funding, one volunteer commented that “retrenching” has been occurring because the funds are not there (TZ: 6). The suggestion made is to “articulate how much [the Zoo] has that flows out of the Zoo (e.g. panda conservation to the Chinese government)” (TZ: 6). This act of transparency could raise public awareness towards understanding the expenses necessary in operating a zoo and people may become more partial to providing donations as well as “opening up opportunities for sponsors that tie into their own campaigns to bring in funds (e.g. Mandarin [Chinese] Restaurant sponsors the pandas)” (TZ: 3). Finally, if the zoo is not close to a public transportation line, a volunteer suggested coordinating with the city transit to run a shuttle bus from the downtown core to the Zoo, especially during the summer months when tourist season is at its peak to allow greater accessibility and encourage attendance (TZ: 1).

7.4 Summary

Zoos are certainly contributing to animal and environmental conservation but could be more

effective in strengthening how that message is communicated. Some relatively easy changes are within reach and would not cost the zoos anything but could go a long way towards strengthening the public's understanding of, and participation in, wildlife and habitat conservation. Zoos remain caught in the balancing act of attempting to convey and get across their conservation education messages while maintaining an attractive platform to appeal to the public in an effort to raise funds for conservation initiatives. As noted by TZ: 2 volunteer, perhaps the answer lies in the collaborative efforts of zoos working together to ensure the universal message is being heard, which is their goal in protecting the fragile biodiversity of this planet. If this can be achieved, perhaps the stereotype of the 'zoo' as a place for entertainment rather than conservation can be eliminated from the public sphere as well.

8.0 Twenty-first Century Zoos in an Era of Environmental Uncertainty

8.1 Conclusions

This thesis considers how zoological institutions are attempting to contribute to conservation through environmental education and whether or not they were successful. Secondary research along with an in depth investigation of three accredited Canadian zoos – the Calgary Zoo, the Toronto Zoo, and the Vancouver Aquarium were used to explore this question. Semi-structured interviews with volunteers offered insight into volunteer perspectives about the role of zoos as facilities for conservation education. In addition, a social media analysis of the zoos' Facebook pages was completed to see if there was any demonstrated evidence of learning outcomes in visitors through their own posts offering feedback of their experiences of the zoo.

Current on-site learning opportunities at the zoos aim at fostering effective environmental educational approaches. In particular, deep and experiential learning opportunities change the teaching approach from the liberal tradition, which focuses on the student/teacher dynamic, to the progressive tradition, which focuses on experiences for the individual with an emphasis on learning by doing as encouraged in experiential learning. For instance, Zoo Camp provides campers with the opportunity to see areas of the zoo that are restricted to the public to allow for a more in depth understanding of the behind-the-scenes work occurring at zoos. Also, campers participate in preparing enrichment devices for a specific animal, deliver it to the keeper and observe the animal interacting with the device while having the opportunity to listen and ask the keeper questions. Adult visitors also have the opportunity to interact with volunteers at interpretive stations through the use of biofacts related to the animals in the exhibit. A visitor can touch the skull of a cheetah and learn from the volunteer about their

hunting habits, or feel the pelt of an otter and understand how they have adapted to an aquatic environment. Zoos are moving away from a liberal philosophy of education (i.e. a more passive, observational approach) to one that is more engaged and hands-on or experiential/progressive. The educational literature suggests that these approaches to learning result in ‘deeper’ learning, a concept that is further supported by the primary research findings.

The social media results did not reveal sufficient evidence to make a determination on whether zoos are successfully educating the public in the area of conservation. These findings are not a definitive indication that zoos are failing to meet their conservation education goals, only that there is very little evidence of learning outcomes being fulfilled through this particular method of assessment. The secondary literature review suggests that social media can be a powerful communication tool used by zoos to complement and support their conservation education mandates. Social media sites like Facebook could also be an effective outlet to engage youth audiences given that the youth are actively involved in this form of communication. Nevertheless, the evidence was not there in the analysis conducted of four zoos social media sites. It would not be a significant expenditure on the part of the zoos to investigate how those social media sites could be effectively used for disseminating their conservation education message; the potential value of doing so would far outweigh the costs.

From the primary research involving the volunteers, the case studies, and the researcher’s personal observations, it is clear that zoos provide many opportunities and initiatives that contribute to conservation and education. For example, zoos collaborate with post-secondary institutions, government, and non-government organizations on a variety of citizen science projects. The primary interviews revealed that the act of participating in citizen science and other zoo-hosted/affiliated initiatives can inspire positive behavioural changes in participants.

The interviews, including the one conducted with wildlife zoologist, Dr. Anne Dagg, and the personal observations of the researcher suggest that zoos provide a diversity of conservation education opportunities for visitors. Moreover, the evidence suggests that such efforts can promote positive awareness and changes in visitor behaviour. Dr. Dagg advocates for the role of accredited zoos as places for educating the public about the plight of endangered species. While they may be considered ‘unnatural,’ zoos allow visitors to familiarize themselves with animals, acting as ambassadors for their species in the wild.

There are challenges, however, with respect to the conservation mandate. It is easy to see how zoos could fail to inspire stewardship and effectively convey a conservation education message. Zoos are highly commercialized, and often crowded given that they are major tourist attractions and are often close to many city centres. Many hours could be spent at a zoo by a visitor who gives little to no thought to conservation or education. What the public does during a trip to the zoo is beyond the control of zoo managers (Kusiak, 2012). Numerous learning opportunities, however, are available to visitors who choose to engage in the experiences offered, be it reading an information plaque, attending a keeper talk, or signing up to experience an overnight program.

The findings of this thesis contribute to a growing body of academic work concerned with environmental education within urban zoos. While many studies have focused on American and British zoos, this thesis has looked at three Canadian zoos. Further, this thesis examines social media as an outlet for communications from zoos, and evaluates how visitors respond to these communications with regards to environmental education and stewardship actions. More than ever, zoos are using social media to communicate with visitors and the public, and there is limited other research done concerning the public response to zoos’ utilization of social media as

a tool for communicating conservation mandates to an online audience. In addition, the use of semi-structured interviews conducted with volunteers differs from other research, which uses questionnaire style methods for data collection (Bixler, 2013). The semi-structured interview gives volunteers the opportunity to express personal narratives and provides a deeper understanding of volunteer perspectives beyond what can be gained from questionnaire style data. This deep understanding is extended across all three case studies and provides a broader volunteer perspective as well. This thesis also extends the environmental education literature presented by looking at experiential education and authentic, deep learning in the context of the contemporary zoo.

8.2 Recommendations for Future Research

There are some relatively easy strategies that could be employed to enhance visitor knowledge such as through their online presence as noted above. Future research could monitor the online content output of zoos and the responses related to posts made by the zoos. This research would offer ways in which these facilities can best target younger audiences through social media and other online avenues.

Comparative research could also be conducted to determine the effectiveness of enhanced learning opportunities at zoos. For instance, this could be done by surveying zoo visitors before and after a trip to determine if their knowledge of conservation and environmental issues has increased. After a sufficient amount of data is collected, the zoo would implement enhanced learning opportunities for visitors in line with the recommendations made in Chapter Seven. After several months to a year, the same surveys would be given to visitors before and after, and compared to previous results to assess the impact of these improved conservation education

opportunities. Commissioned independent surveys on the impact of the conservation messages in zoos would be worthwhile. Further, studies could be done on the value of social media as an instrument for communicating the conservation messages of zoos. Drawing on the research of Falk et al., more research could be undertaken to investigate visitor motivations for visiting zoos. Such information would make it easier to target conservation education-related material depending on the motivation.

This study can serve to assist zoos in identifying how to encourage actions that would foster conservation of endangered species and their habitat. Zoos can better prepare themselves for future programming and planning by identifying multiple learning styles in individuals and understanding the motivations for visits to their site. The potential for real learning can be achieved through the numerous examples mentioned in Chapter Three (Section 3.3) and would facilitate authentic learning that could lead to changes in visitor behaviour with respect to conservation efforts.

Real-world relevance as an element in authentic learning is notably applicable to zoos. Both formal and non-formal learning activities can highlight the many careers centered on accredited zoos and aquariums. These efforts range from summer camps with behind-the-scenes tours of research facilities to curriculum-based programs involving realistic examples to apply to concepts or problems. Authentic learning can be used to approach complex, real-world issues related to zoos and conservation. For instance, children enrolled in summer camp programs in zoos are often asked to approach problems from different perspectives (e.g. wildlife veterinarian, exhibit designer, nutritionist, etc.). Such an approach offers an opportunity for a sustained investigation of complex environmental problems.

Authentic learning activities at zoos and aquariums can provide opportunities for participants to approach a task using numerous resources both on and off-site. Educational program facilitators could adopt a collaborative learning approach encouraging interested participants and visitors to explore multiple sources and resources and approach the task from a range of theoretical and practical perspectives. Such collaborative education would take place within the zoos organization itself as well as through external partnerships. Cooperation amongst multiple departments within a zoological facility would help to more holistically educate all members working and volunteering at the zoo about complex conservation issues—topics which they could then more effectively share with external stakeholders. Collaborative efforts lead to opportunities for individuals to reflect on their learning both independently and as a community of interest.

Collaboration with other participants can extend to the encouragement of cross-disciplinary efforts. The ability to think in interdisciplinary terms is advantageous in zoos, with the understanding that many decisions and efforts involve resources from multiple specializations. Zoos and aquariums operating reintroduction and translocation programs must work with policy makers and other external stakeholders to make a difference in species survival. Continuing with multiple perspectives, ongoing integrated assessment can most effectively be carried out throughout authentic activities as this reflects real-world evaluations. Ideally, the assessment should not happen at the end of the activity but should occur as the learning is taking place. This would encourage opportunities for improvement as the learning is occurring and the learners would receive feedback from the facilitators and each other. People involved in zoological conservation projects can be constantly improved throughout the learning process and even beyond it.

Learning activities should not just result in the task being successfully completed. Rather than focusing on completing the exercise, participants could be encouraged to create something meaningful and ongoing. For instance, instead of simply completing an exercise to design an exhibit for a new animal at the zoo, participants could be given the opportunity to speak with exhibit designers at a zoo and share ideas with them that could be used in practice. This recommendation also applies to conservation projects where the outcome is not necessarily finite in its results. Opportunities could be created for continued monitoring and further research. This suggestion also extends to on-site research studies of animals in captivity. For almost every conservation related problem, there is no correct answer and no one correct way to interpret neither the problem nor how it should be solved. An instance of where this principle is most evident is in species conservation efforts. There are numerous competing philosophies about how best to manage animal populations, whether through habitat restoration, captive breeding, species translocation or other methods. There is no single correct course of action, or correct way to go about any particular conservation effort. These principles of discussion, collaboration and open-ended problems with open-ended solutions need to be incorporated into the conservation education presented at zoos so that visitors understand the complexity of issues surrounding environmental conservation worldwide.

Zoos and aquariums continue to employ and improve experiential and authentic learning techniques as discussed in Chapter Three. These techniques can open visitors up to receiving biodiversity and conservation information. Further, this knowledge can encourage visitors to adopt positive conservation attitudes.

Within this social and continuous learning context, zoos can further benefit by a more collaborative communications approach within their institutions between their different units:

public relations and media, education, handlers, administrators and volunteers. The many important conservation initiatives mentioned in the thesis and the valuable role played by zoos can be strengthened by a shared communications message from the on-site educational experience, to social media outreach and beyond with the numerous citizen science efforts taking place at all of the facilities investigated in this study.

The 2014 World Wildlife Fund reported, “The world populations of fish, birds, mammals, amphibians and reptiles fell overall by 52 per cent between 1970 and 2010, far faster than previously thought” (Canadian Broadcasting Corporation, para. 1; World Wildlife Fund). Zoos play an important and crucial role in the protection of valued species and ecosystems on which long-term sustainability depends. If zoos were not in existence, something similar would need to be in their place to fulfill their mandates. More can be done, however, to enhance their ability to share their message and garner support and behavioural change towards conservation from a larger segment of the visiting public. This thesis has suggested that opportunities exist to adopt more contemporary approaches to environmental education, to utilize more effective communications efforts specifically through the use of web-based social media, and to employ more collaborative approaches within these zoological institutions and beyond.

Appendices

Appendix A: Interview Questions for Zoological Institution Volunteers

Personal questions & commitment

1. Why do you volunteer with the zoo/aquarium?
2. How long have you been volunteering with the zoo/aquarium?
3. How did you first learn about volunteering at the zoo/aquarium?
4. What do you do here at the zoo/aquarium?
5. Why do you volunteer at the zoo/aquarium?
6. How many hours do you dedicate to volunteering at the zoo/aquarium?
7. Why do you do these particular activities?
8. Into which age category do you fit? Under 25, 25-50, over 50
9. Do you volunteer elsewhere? If so, where?

What do volunteers view as the role of zoological institutions and why they are important?

1. Please tell me a little bit about your perspectives on animal conservation.
2. Can you list the various types of facilities or initiatives that promote animal conservation?
3. Where, if anywhere, would you rank accredited zoological institutions on this list?
4. Accredited zoological institution mandates have been changing over the years to foster public education towards conservation. For example, the Toronto Zoo's mandate is stated as being <insert appropriate zoological institution mandate>. Do you think that they can play this role effectively? Why or why not?
5. What role do you see accredited zoological institutions playing?
6. Are accredited zoological institutions important?
7. In what way are they important?
8. What is unique/special about the zoo/aquarium?

Links to education

1. Do accredited zoos/aquariums provide learning opportunities for visitors?
2. If so, how do they do this?
3. What information are you using to determine if accredited zoos/aquariums are effective in promoting public education?
4. What does the zoo/aquarium do to provide the most successful learning opportunities to reach visitors?
5. Does your role as a volunteer contribute to educating visitors?

Links to conservation & stewardship

1. What role do you think the zoo/aquarium plays in your life? In visitors lives? In city life?
2. How do you think visitors perceive the zoo/aquarium?

3. Did your perception of the zoo/aquarium change after volunteering here?

Prompts

1. Do accredited zoos/aquariums educate the public?
2. Do accredited zoos/aquariums contribute to stewardship and conservation?
3. Define stewardship?

Appendix B: Interview Questions for Zoological Institution Expert

Expert Interview Questions

1. Please tell me a little bit about your perspectives on animal conservation.
2. Can you list the various types of facilities or initiatives that promote animal conservation?
3. Where, if anywhere, would you rank accredited zoos/aquariums on this list?
4. What role do you think accredited zoos/aquariums play in today's world?
5. Accredited zoological institution mandates have been changing over the years to foster public education towards conservation. For example, the Toronto Zoo's mandate is stated as being <insert appropriate zoos mandate>. Do you think that they can play this role effectively? Why or why not?
6. What can accredited zoos/aquariums do, if anything, to better their position in conservation through environmental education? <question for outside experts only>
7. What evidence would you need to determine the zoo/aquarium is successful in their environmental education towards conservation?
8. How are you assessing environmental learning by visitors? How do you know it works? <questions only for those who run zoo/aquarium programs>

***Appendix C: Areas of Primary Focus for CAZA Accreditation Process Guide
(A Summary from Canada's Accredited Zoos and Aquariums, 2014)***

Areas of Primary Focus

- Governing Authority
- Staff
- Support Organization
- Finance
- Physical Facilities
- Safety/Security
- Animal Collection
- Veterinary Care
- Conservation
- Education
- Research
- Other Programs/Activities

For more information see CAZA's Accreditation Process Guide, April 2014 edition.
(http://www.caza.ca/documents/document_AccreditationProcess.pdf)

Appendix D: Social Media Findings for Assiniboine Park Zoo

At Manitoba's Assiniboine Park Zoo there was little evidence from the social media analysis that reflected positive changes in behaviour with respect to stewardship and learning. Only 12 screen shots out of a total 475 indicated that some environmental education or stewardship had taken place as a result of the visit to the zoo.

A total of six responses demonstrated some evidence that the visitor had retained environmental education information. For example, Assiniboine Park Zoo posted images of a newborn squirrel monkey to which a visitor responded "Wow gorgeous! [I] didn't know they were born with eyes open. I thought they were sealed like a puppies." Another example of environmental education is demonstrated through an individual who wanted "to honestly learn"

about the predator vs. prey exhibits between the polar bears and the seals and if the polar bears are agitated by the seals proximity. Assiniboine Park Zoo replied to that posting with a detailed rationale explaining predator vs. prey exhibits' standard design in zoos. The Zoo representative stated that the zoo would closely monitor both species to ensure they adjust accordingly to their new environment.

One response demonstrated knowledge regarding conservation initiatives and five responses spoke of actions relating to stewardship. An instance indicating knowledge of conservation initiatives followed a photo of a baby snow leopard posted by the Zoo where one visitor acknowledged Assiniboine Park Zoo's involvement in snow leopard Species Survival Plan "in order to aid in the survival of the entire species."

An example of a conservation action taken by a visitor is the purchase of tickets by visitors for The Great Manitoba Duck Race with proceeds directed to the Assiniboine Park Conservancy's redevelopment of Assiniboine Park & Zoo. An additional action was noted where a philanthropist couple donated \$500,000 towards the construction of a new Amur tiger habitat to facilitate the continuation of the breeding program for this species of tiger at the Zoo. Finally, in celebration of Canada's Garden Day, grade 1 and 2 students from a local school participated in the release of butterfly species in the Shirley Richardson Butterfly Garden on-site.

Assiniboine Park Zoo Social Media

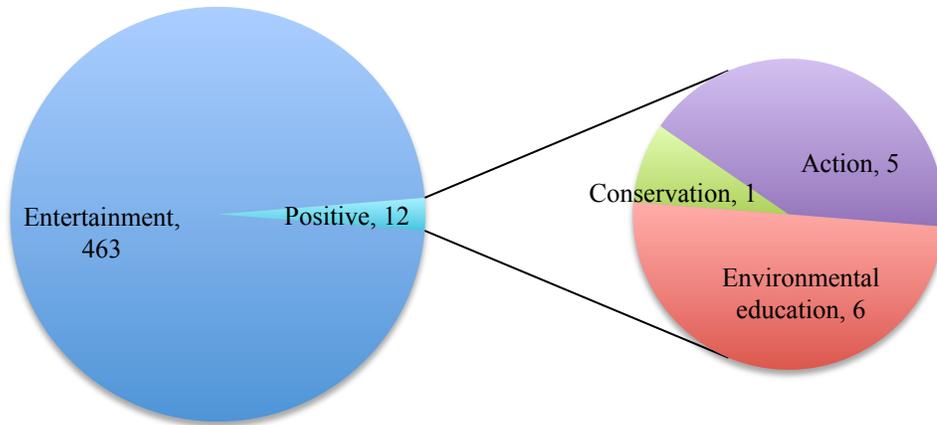


Figure D.1: Assiniboine Park Zoo Social Media Findings

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