Teaching and Learning about Zoos and Biodiversity Conservation: 
Student, Teacher, and Zoo Staff Perspectives and Experiences

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Abstract

This study is situated at the intersection of school science and zoo education programs. It seeks to contribute to the literature by focusing on the perspectives and experiences of students, teachers, and zoo staff. The research moves beyond focusing on a visit to the zoo to include a complementary unit of study in a science classroom. Using a case study research design (Yin, 1994), I engaged in a unit of study focusing on zoos and biodiversity conservation with a teacher and his Grade 11 biology class; conducted interviews with the teacher, 14 students, and 11 zoo staff; administered teacher and student surveys; and collected supporting documentation. The curricular context for this study aligned with STSE education emphases and strategies (Pedretti & Nazir, 2011). Significant themes were identified in the data using the constant comparative method (Lincoln & Guba, 1985) and formed the basis for six vignettes (Polkinghorne, 1995). It was found that the teacher and most students held mixed views (concurrently for and against zoos), except for one student who held a consistent against-zoos stance. The zoo staff held a predominately for-zoos stance, yet were concerned about poor public perception of zoos. Findings suggest that the complex nature of modern zoos in society (Hyson, 2004; Lindburg, 1999) was reflected in the participants’ views. The teacher and zoo staff responded to these views in various ways, but educating the students about zoos was most common. The students stated that views against zoos did not impact their learning, although occasional tension over views occurred amongst students and the variable nature of zoos appeared to affect the students’ willingness to learn in zoos. The students revealed that exposure to multiple perspectives
influenced how they formed views on zoos, and educator positioning on zoos was noticed by the students. These findings suggest that the teacher and zoo staff faced pedagogical challenges when responding to multiple views on zoos, including positioning on issues and influence over students. Implications from this research are provided for consideration by researchers, teachers, and zoo staff.
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CHAPTER ONE:
INTRODUCTION

Many teachers would support the contention that visits to zoos or wildlife parks offer more direct, and therefore more powerful, learning experiences than do surrogates such as books, films, or models. However, for some pupils the educational benefits of such visits may be marred by the negative attitudes of these children to such institutions... We suggest that it is helpful to teachers of science to be aware of the prevalence of different views about such issues, because some attitudes may hinder learning in this area by producing a resistance to, or distraction from the subject matter. (Greaves, Stanisstreet, Boyes, & Williams, 1993, p. 58-59)

Teachers commonly enrich the regular science classroom program for students through visits to informal learning sites, such as zoos, museums, and science centres (see for example, Hodson, 2003; Pedretti, 1999; Ramey-Gassert & Walberg, 1994; Rennie & McClafferty, 1995). Through these experiences students are immersed in new and often stimulating environments, and are exposed to educators who in some cases are considered to be experts in a given field. Much research supports positive learning outcomes from informal learning opportunities (see for example, Dierking, Burtyny, Buchner, & Falk, 2002a and 2002b; Falk, Reinhard, Vernon, Bronnenkant, Heimlich, & Deans, 2007; Sullenger & Turner, 2015).

Greaves et al. (1993), however, question what students feel and think about zoos, and the impact that their feelings may have on students’ willingness or resistance to learning in, or about, zoos. They suggest that it might be helpful to teachers participating in zoo field trips to be aware that students may hold concerns or objections relating to zoos, and that these views may affect student learning in these institutions. Concerns relating to teaching and learning in a zoo setting are reasonable given that the identity and roles of zoos in society are complex and at times contradictory (Fernandez, Tamborski, Pickens, & Timberlake, 2009; Hancocks, 2012; Hyson, 2004; WSPA & Zoocheck Canada., n.d.). Zoos have the potential to evoke passionate feelings in people, relating primarily to the relationship between people and zoos, and/or the rights and welfare of zoo animals (Bertram, 2004; Chiszar, Murphy, & Iliff, 1990; Lindburg,
1999; Malamud, 1998; Mullan & Marvin, 1999; Wickins-Drazilova, 2006). Zoos themselves acknowledge a rise in public concern and activism relating to zoo animal rights and welfare and increased accountability demands placed on zoos in recent years (AZA, 2004; Lindburg, 1999).

This study is situated at the intersection of school science and zoo education programs, amidst the complexity and controversy surrounding zoos. It attempts to bridge together work from various areas of relevant research to develop a better understanding of the participants’ voices, perspectives, and experiences relating to teaching and learning about zoos and biodiversity conservation in the school science context. This includes consideration of the teaching and learning concerns raised by Greaves et al. (1993) and other issues that may arise when teaching and learning about zoos and related topics which may be considered sensitive or controversial in nature (e.g., zoo standards of practice and captive breeding practices).

The curricular context for this study specifically aligns with secondary provincial curriculum objectives and contemporary approaches to teaching and learning in science education, namely those which fall within the science, technology, society, and environment (STSE) education framework. In this way, zoos and biodiversity conservation are explored in a Grade 11 biology classroom and at the zoo through consideration of scientific evidence and logical thinking, sociocultural, political, value-based, and ethics emphases. The students are encouraged to: develop positive conservation-related knowledge, attitudes, and actions; think critically, examine their own values and beliefs, and formulate their own opinions; and share opinions, thoughts, and ideas through dialogue in small groups and in whole class discussions.

The remainder of Chapter One is an introduction of this research and includes: a rationale for the study; research objectives; literature review; methodology; researcher positionality; and outline of the dissertation.
Rationale for Study

The significance of developing a better understanding of the participants’ voices, perspectives, and experiences relating to teaching and learning about zoos is clear when you think of the large volume of visitors who partake in field trips to zoos and aquariums annually. For example, Canada’s accredited zoos and aquariums reach over 1,300,000 children and adults each year (CAZA, 2015). More broadly, zoos and aquariums accredited by the Association for Zoos and Aquariums (AZA) report training and supporting science curricula for over 400,000 teachers, and receive over 12,000,000 annual student visitors through school field trips (AZA, 2015). Expanding our understanding of the zoo field trip experience, and how it can be improved upon, may benefit the many stakeholders participating in, and contributing to, these educational experiences.

Further rationale for this study is provided by calls made in the literature for more research on the “true prevalence of animal rights’ beliefs and concerns amongst the general public” as they relate to accredited zoos and aquariums (AZA, 2004, p. 12); and for research on people’s voices, perspectives, and experiences related to zoos (AZA, 2004; Hancocks, 2012; Hyson, 2004), including those in the context of zoo-based teaching and learning experiences (Davidson, Passmore, & Anderson, 2009; Greaves et al., 1993). These calls are reasonable considering the complex, multi-dimensional nature of zoos, and that research on people’s perspectives on zoos and related experiences within the context of school science is limited.

After taking note of the concerns raised in the literature, particularly those raised by Greaves et al. (1993) relating to the potential impact of student views against zoos on teaching and learning experiences, I felt compelled to explore how the participants in this study view zoos and further, how they respond to multiple and possibly conflicting views in the classroom and at the zoo. My study expands the literature by focusing on all three stakeholder groups—the
students, the teacher, and the zoo—and goes beyond focusing on a one-time visit to the zoo to include a complementary unit of study in the science classroom.

**Research Objectives**

The specific research intent of this study is to develop a deeper understanding of the participants’ (students, teacher, and zoo staff) perspectives and experiences related to teaching and learning about zoos during a biodiversity conservation unit of study, in a zoo setting and in the science classroom. This is accomplished through collaboration with a secondary school teacher, his Grade 11 biology class, and a large, professionally-managed zoo. The intent is reflected in the two major research questions, explored within this context:

1. What are the participants’ (students, teacher, and zoo staff) perspectives on zoos?
2. How do the participants respond to multiple perspectives on zoos, in the classroom and at the zoo?

Previous research supports the assumption that multiple views on zoos (see Figure H1 in Appendix H) are likely to exist among the participants in this study (Finlay, James, & Maple, 1988; Greaves et al., 1993; Reade & Waran, 1996; Tofield, Coll, Vyle, & Bolstad, 2003). The first research question seeks to confirm this assumption by exploring the nature of the views on zoos held by the participants through the gathering of in-depth information on these views. The second research question builds on the first, by exploring how the participants respond to multiple views when engaging in teaching and learning experiences relating to zoos. This includes developing an understanding of how the participants respond to challenges such as when they are faced with views against zoos, and how the teacher and zoo staff position themselves on issues relating to zoos and biodiversity conservation that might be considered sensitive or controversial in nature.
Overview of Literature Review

As humans, our current and historical relationships with zoos and zoo animals are remarkably complex and have inspired much fiction and nonfiction writings, as well as research across numerous academic disciplines such as education, psychology, zoology, history, philosophy, biology, architecture, and sociology. The rich, multi-disciplinary nature of research focusing on zoos is reflected in the literature reviewed for this study.

The three main areas of relevant literature reviewed are: “The Zoo Context: Past and Present”; “The School Context: Science, Technology, Society, and Environment (STSE) Education”; and “Perspectives on Zoos and Related Teaching and Learning Experiences.”

This chapter begins with a review of the history of public zoos through to modern day; contemporary professional zoo regulatory bodies, including the Association of Zoos and Aquariums (AZA), Canada's Accredited Zoos and Aquariums (CAZA), and World Association of Zoos and Aquariums (WAZA); as well as regulation of zoos in Ontario specifically. In addition, modern day zoo mission objectives, and some of the complexities relating to the identity and roles of modern day zoos are explored.

The study is then situated in the school science context, through a review of literature primarily relating to the STSE education movement. This section of the review explores STSE education emphases and strategies, the Ontario context for STSE education, and implementation challenges including educator positioning and influence.

The final section of the literature review focuses on what is known about people’s perspectives on zoos and related teaching and learning experiences. This begins with an overview on the arguments “for” and “against” zoos, followed by public perspectives on zoos. The review ends with a look at the perspectives on zoos held by the students, teacher, and zoo
staff, and responses to these views in school and zoo educational settings where available, although this specific area of research is limited.

**Overview of Methodology**

This qualitative study best fits within the paradigm of naturalistic inquiry (Denzin & Lincoln, 2000; Lincoln & Guba, 1985), as the participants were studied in their natural settings for the purpose of exploring, in detail, their interpretations of the phenomena in a specific context. Understanding the experiences and hearing the voice of all the stakeholders involved in school visits to informal learning sites, such as zoos, is a significant aim of this research and an integral part of naturalistic research in general.

A case study research design (Berg, 1998; Bogdan & Biklen, 1998; Creswell, 2008; Hammersley & Gomm, 2000; Stake, 2000; Yin, 1994) was used to gather rich, detailed data relating to the participants’ (students, teacher, and zoo staff) perspectives and experiences in this case. The participating zoo is located in southern Ontario and is one which espouses education and conservation mission objectives.

I spent eight months in the data collection phase of this research, working closely with an experienced secondary school science teacher and his 14 students during a Grade 11 unit of study focusing on the topic of zoos and biodiversity conservation. During this time I also recorded field notes on observations made in the classroom and at the zoo; administered a survey to the teacher and students before and after the unit of study; conducted interviews with the teacher and students before and after the unit of study; and collected numerous samples of the students’ work. In addition, I conducted interviews with 11 zoo staff members (including a department manager, a department supervisor, four department coordinators, a curator, two school workshop leaders, and two volunteers), toured the zoo and corresponded occasionally with a department coordinator, and collected relevant zoo documents. Permission was obtained
from the University Research Ethics Board, the participating school board, the principal of the participating school, the zoo, and every individual participant (i.e., the teacher, students, and zoo personnel) prior to the start of data collection.

Ongoing qualitative data analysis was done over the course of the research project through the use of the constant comparative method (Lincoln & Guba, 1985; Maykut & Morehouse, 1994). Through this method of systematic analysis of the data significant and overarching themes emerged (Maykut & Morehouse, 1994). In addition, narrative vignettes based on the emergent themes were created to help capture the essence of the participants’ experiences and meaningful events in the case, as well as to provide the reader with rich contextual detail (Polkinghorne, 1995).

**Researcher Positionality**

Allies (1999, p. 2) suggests that as researchers, “we ought to know and acknowledge our personal, practical, ideological, cultural and theoretical positionality, and if we can, discover and discuss the impact it has on our research.” Allies further discusses positionality as having an impact on the selection of research area, choice of methodology, and impact on the research process. I agree with Allies on the importance of researcher transparency and in this section I discuss my positionality on this research.

Doctoral coursework helped spark an interest in this research topic and helped determine the theoretical and methodological frameworks chosen for this study. Graduate classes focusing on teaching and learning science (in school and informal educational settings) were especially influential in helping me form opinions on positions related to this research. In these courses I came to appreciate the complexities and benefits of contemporary approaches to science education, such as the science, technology, society, and environment education movement (Pedretti & Nazir, 2011), and began to see this as an important shift in science education from
the traditional approaches that I had known previously. In my opinion, many modern emphases and strategies: are more inclusive (for example through “a science for all approach”); reveal a more contemporary and realistic view on the nature of science (NOS); aim to inform students of the environmental, political, social, and ethical consequences of science and technology in their everyday lives; incorporate more issues-based approaches; and, in some cases, encourage students to take personal action (see for example, Hodson, 2003; Pedretti & Nazir, 2001). But the greatest influence in my choosing this research topic was a graduate course focusing specifically on teaching and learning science outside of the school (i.e., in zoos, museums, and science centres). In this course I recalled my own positive learning experiences stemming from these informal learning sites, and became captivated by the complexities of this field of research and its great educational potential. I share these positions and experiences because they informed my decision to pursue this topic and they are the lens through which I conduct this research and write this report.

Outline of Dissertation

The outline of this dissertation is as follows. Chapter Two (Literature Review) is a review of three main areas of relevant literature: “The Zoo Context: Zoos Past and Present”; “The School Context: Science, Technology, Society, and Environment (STSE) Education”; and “Perspectives on Zoos and Related Teaching and Learning Experiences.”

Chapter Three (Methodology) revisits the research intent and describes the theoretical and methodological frameworks; the research sites (i.e., the secondary school and zoo); the participating students, teacher, and zoo personnel; and the curricular unit of study. Data collection, including the role of the researcher, and analysis techniques; study limitations and ethical considerations are also described.
Chapter Four (Participant Perspectives on Zoos) and Chapter Five (Participant Responses to Multiple Perspectives) describe the major findings of this research inquiry. Each of these chapters addresses one of the two major research questions through the use of vignettes and detailed descriptions of the findings.

Chapter Six seeks to interpret the findings relevant to each research question through connections to relevant literature. And lastly, Chapter Seven concludes the thesis with a study summary, implications stemming from this research for consideration by zoo and school educators, reflections and suggestions for future research, and concluding statements.
CHAPTER TWO:
LITERATURE REVIEW

The literature reviewed in Chapter Two relates to the core concepts of this study, which are participant perspectives and experiences related to teaching and learning about zoos and biodiversity conservation in the science classroom and in a zoo setting. Specifically, this chapter is a review and synthesis of the following areas of relevant literature:

1. The Zoo Context: Past and Present
2. The School Context: Science, Technology, Society, and Environment (STSE) Education; and
3. Perspectives on Zoos and Related Teaching and Learning Experiences.

Throughout this review, gaps in the literature and researchers’ recommendations for future research will be identified, as part of the development of the rationale for the current study.

The Zoo Context: Past and Present

One of the key areas of research informing this study is what I have called “The Zoo Context,” which includes a broad range of literature and citations focusing on the study of zoos from historical times to modern day. Part of what makes this literature so rich is that it has been explored across numerous domains, including education, biology, environmental studies, philosophy, recreation and leisure studies, travel and tourism studies, and architectural studies, to name a few.

A Brief History of Public Zoos

Word Origin and History for ‘zoo’

1 I have highlighted some important aspects here to provide the reader with an overview on the history of public zoos. A full account of the history of zoos is extensive and goes beyond the scope of this literature review.
The beginnings of zoos can be traced back to collections of wild animals in ancient times; however the first public zoos originated in the early 19th century with public zoological gardens, such as Regent’s Park, emerging in major European cities such as London, Paris, and Berlin (Hyson, 2000; WAZA, 1993). Rabb (1994) sees the evolution of zoos as a general shift from “menagerie” to “zoological park” to “conservation center” (p. 162), although he acknowledges that most modern zoos contain elements from all three stages of development (see Figure H2 in Appendix H).

According to Rabb (1994), zoos in the 19th century were typically menageries displaying animals to visitors; he also calls them “Living Natural History Cabinets” (p. 162). A central theme of zoos in this time period was a focus on taxonomy, particularly as it related to diversity and adaptation of animals, and enclosures were usually cages.

The 20th century saw a shift in many public zoos—from menageries to zoological parks or “Living Museums” (Rabb, 1994, p. 162). In this stage of zoo development the emphasis was on ecology and encouraging an appreciation for species and their habitats among visitors and exhibits often took the form of dioramas.

Zoos in the 21st century are seen as shifting towards becoming conservation centres (Rabb, 2004; Rabb & Saunders, 2005; WAZA, 1993 and 2005). Rabb (1994) also calls these modern zoos “Environmental Resource Centres” (p. 162), for which environmental themes with a focus on ecosystems and species survival are prominent. Zoos in this stage of development contain immersion exhibits “in which the visitor is immersed in parts of the natural environment simulated for the animals” (Rabb, 1994, p. 162).

Hyson (2000) critiques Rabb’s (1994) representation of the evolution of zoos, arguing that “looking back over the past one hundred and forty years [of American zoos], we cannot plot a straightforward path from artificial menagerie to natural zoological park to environmentalist
Hyson (2004) continues this argument in a subsequent article, suggesting that the complexities of zoo identity and roles in society have created challenges for zoos throughout their history. For example, he argues, after acknowledging significant zoo advancements over the years, that when it comes to public perception and impact, zoos’ victories and struggles have been repeated throughout their history:

. . . every generation of zoo boosters has claimed to be on the cutting edge. Every generation has seen itself as the zoological vanguard that will finally create a more “natural” zoo, not only to enhance the lives of its captive creatures but also, and perhaps even more significantly, to alter popular attitudes about wildlife and the environment through exhibition, education, and exhortation. And yet, ritualistically, every generation has largely failed to realize these grand ambitions. While the animals may have more space and the curators more postgraduate degrees, the zoo-goers have remained stubbornly uninterested in the finer points of wildlife protection, habitat destruction, and species survival programs. To most visitors, a day at the zoo is not about environmental education; it’s about family entertainment. (p. 248)

Hancocks (2012) critiques the slow progression of zoos, arguing that many enclosures and practices of modern day zoos have similarities to zoos of the past and makes a passionate call for change.

Compared to 100 years ago, zoos today offer excellent medical care and diets, but these simply reflect improvements in human society. And though zoo animals no longer live in barred cages, they often exist in conditions little better than the old menageries. Too many modern zoo spaces are too small, and while the spaces look green, the animals have no contact with living vegetation, and shuffle along dusty corridors confined by electric wires.

The main difference from a century ago is a new look, which is essentially superficial, and is typically a peculiar distortion of the natural world, since zoos have developed a design vernacular that I think is best described as Tarzanesque. Modern zoos often resemble a Hollywood version of Africa on a B-movie set. (p. 1)
Hancocks (2012) argues that the future of zoos depends on zoos “acceptance of shortcomings, awareness of self-delusion and false claims, and earnest degree of self-criticism, and openness to the concerns of others” (p. 1). In this vein, he makes a call for continued, and frequent, opportunities for dialogue on the ethics, values, and options within the zoo community.

Hancocks also suggests specific actions for the improvement of zoo design including: having new specialist design teams such as landscape architects, geologists, and ecologists to create authentic animal enclosures which “demonstrate sustainability, biophilia, and welfare values to share with visitors” (p. 5).

Modern Day Zoos

**Regulation of zoos.** There are several agencies which help regulate modern day zoos around the world. These agencies establish and require adherence to certain standards of practice in the treatment and care of zoo animals. What follows is a review of three commonly cited agencies which offer accreditation to professionally managed zoos and aquariums in Canada.

**Association of Zoos and Aquariums (AZA).** AZA is “a non-profit organization dedicated to the advancement of zoos and aquariums in the areas of conservation, education, science, and recreation” (AZA, 2015). The organization’s mission is to provide “its members with the services, high standards, best practices and program coordination to be leaders in animal welfare, public engagement, and the conservation of species” (AZA, 2015).

AZA was formed in 1924 and currently supports membership for 229 zoos and aquariums world-wide, collectively receiving approximately 180 million visitors annually (AZA, 2015). Accredited members are required to “meet rigorous professional standards for animal welfare, veterinary care, wildlife conservation, scientific research, education, safety, staffing, and more” (AZA, 2015). AZA accredited zoos and aquariums aim to offer the
following public benefits: enhance local economies; provide visitors with connections to the natural world; provide training and support for teachers; provide teaching materials and hands-on learning opportunities for school groups; contribute to knowledge and interest in science for visitors; provide protection and conservation plans for numerous threatened and endangered species; contribute to science; and provide excellent care for more than 700,000 zoo and aquarium animals (AZA, 2015).

**Canada's Accredited Zoos and Aquariums (CAZA).** CAZA “represents the leading zoological parks and aquariums in Canada” and “promotes the welfare of, and encourages the advancement and improvement of, zoological parks, aquariums and related animal exhibits in Canada as humane agencies of recreation, education, conservation, and science” (CAZA, 2015). The mission of CAZA is to “unite the Canadian Zoo and Aquarium community in connecting people to nature through animals” (CAZA, 2015).

Founded in 1975, CAZA is a newer and smaller regulatory body than AZA, offering accreditation to zoos and aquariums located only in Canada. It serves to standardize “professional conduct and practices through a comprehensive accreditation program with a respected Code of Ethics” (CAZA, 2015). CAZA accredited zoos and aquariums “nurture, protect and care for more than 100,000 animals representing over 2000 species, many involved in important ex-situ and in-situ conservation projects” and they “reach an estimated 11 million annual visitors” (CAZA, 2015).

**World Association of Zoos and Aquariums (WAZA).** An overarching membership organization, to which both AZA and CAZA subscribe, WAZA is “a global organization which unifies the principles and practices of over 1,000 zoos and aquariums, which receive over 600 million visitors annually, and sets standards for increasing achievement of conservation” (WAZA, 2005). Originally formed in 1935 as the “International Union of Directors of
Zoological Gardens” (IUDZG), WAZA was a contributing founder of the International Union for Conservation of Nature (IUCN) in 1948, the world's largest global environmental organization, and WAZA continues to represent the zoo community in IUCN and other international alliances and conventions today (IUCN, 2015; WAZA, 2015).

WAZA’s mission is to be “the voice of a world-wide community of zoos and aquariums and a catalyst for their joint conservation action” by striving to be “the global communication platform and representative for a major part of the world zoo and aquarium community; as well as the global catalyst for joint conservation action, business development, marketing, sustainability and membership” (WAZA, 2015). The objectives of WAZA can be summarized as follows:

1. promote cooperation between zoological gardens and aquariums with regard to the conservation, management and breeding of animals in their care;
2. promote and coordinate cooperation between national and regional associations and their constituents;
3. promote environmental education, wildlife conservation and environmental research;
4. assist in representing zoological gardens and aquariums in other international organizations or assemblies;
5. promote cooperation with other conservation organizations; and
6. promote and use the highest standards of animal welfare and husbandry.

(WAZA, 2005, p. 7)

Regulation of zoos in Ontario. Accreditation by a regulatory agency such as AZA, CAZA, or WAZA is not mandatory to operate a zoo in Ontario. Not surprisingly, zoos and aquariums in Ontario vary greatly in their standards of practice, facilities, and management practices, as not all of these facilities seek accreditation (WSPA, 2005; WSPA & Zoocheck Canada, n.d.).

Legislation governing the treatment of animals in zoos and aquariums in Ontario is mandated by the Ontario Regulation 60/09 Standards of Care Act (2009), which was recently added to the pre-existing Ontario Society for the Prevention of Cruelty to Animals Act (1990). The newer Regulation has been summarized as follows:
in March 2009 the Ontario government passed a regulation (O. Reg. 60/09) under the Ontario Society for the Prevention of Cruelty to Animals Act (OSPCA Act) that establishes standards of care for animals kept in captivity in Ontario, including in zoos, aquariums, and theme parks. Under this regulation, captive wildlife must be provided with adequate and appropriate care, facilities and services to ensure their safety and general welfare, as well as a daily routine that facilitates and stimulates natural movement and behaviour. (ECO, 2012)

Critique and calls for continued review and improvement of licensing policies for Ontario’s zoo can be found in the literature (The Canadian Press, 2012; ECO, 2009 and 2012; WSPA, 2005; WSPA & Zoocheck Canada, n.d.). Governance of zoos and exotic animal ownership in Ontario is significant, considering the large numbers of zoos and private owners of exotic animals in the province.

Ontario is a hot bed for wild and exotic animal ownership in Canada. In addition to the half dozen or so larger, better publicized zoos, there are also a significant number of smaller zoo and zoo-type facilities in the province. In fact, out of the approximately 120 organized zoos and wildlife displays in Canada, more than 40% are located in Ontario. There are also thousands of private citizens who keep wild animals, ranging from exotic insects to tigers, as pets. (WSPA & Zoocheck Canada, n.d., p. 5).

Mission objectives of zoos. It is generally accepted that the mission objectives of modern, professionally-managed zoos focus on making contributions in four areas: recreation, research, conservation, and education (see for example, AZA, 2015; CAZA, 2015; Patrick, Matthews, Ayers, & Tunnicliffe, 2007; WAZA, 2015).

The recreation objective is critical to the financial viability of zoos. Zoos must generate enough revenue through ticket sales to maintain operations. This means that in order for zoos to compete for visitors with other leisure-time pursuits, like amusement parks and museums, zoos must be seen as entertaining, engaging, and enjoyable (Bertram, 2004; Hyson, 2000 and 2004). Some accredited zoos and aquariums see themselves as “agencies of recreation” (CAZA, 2015) and aim to provide visitors with “popular family fun” by striving to be one of the “best places for families to connect with nature and each other” (AZA, 2015). An AZA publication (2004)
exploring conservation education trends in accredited zoos and aquariums summarizes the importance of the entertainment mission in the following way:

People have a high level of entertainment expectation. AZA Zoos and Aquariums are perceived well as entertainment venues; however we may not be using this to our advantage. AZA Zoos and Aquariums must prove themselves to also be a value added destination with missions that can enhance a visitor’s life and distinguish us from the competitors. (p. 9)

Zoos strive to meet their research mission by contributing to: the advancement of knowledge in areas such as animal husbandry, health and welfare; animal management to ensure genetically diverse populations; veterinary medicine; and nutrition (AZA, 2015; Bertram, 2004; CAZA, 2015; WAZA, 1993). Chiszar, Murphy, and Iliff (1990) report that zoos successfully meet their mission to contribute knowledge by providing examples of zoo-based research (e.g., breeding, improving exhibit design) and the many ways in which it is shared (e.g., annual conferences, journal articles, web sites). For instance, zoos strive to advance scientific knowledge through contributions to research journals such as *Journal of Zoo and Aquarium Research*, *Journal of Zoo and Wildlife Medicine*, and *International Zoo Yearbook* to name a few. Founded by AZA, *Zoo Biology* is another journal which publishes zoo and aquarium research contributions; its scope is described as follows:

*Zoo Biology* is concerned with reproduction, demographics, genetics, behavior, medicine, husbandry, nutrition, conservation and all empirical aspects of the exhibition and maintenance of wild animals in wildlife parks, zoos, and aquariums. This diverse journal offers a forum for effectively communicating scientific findings, original ideas, and critical thinking related to the role of wildlife collections and their unique contribution to conservation. (Wiley & Sons, 2015)

Patrick et al. (2007) analyzed mission statements of 136 AZA-accredited zoos in the United States and found that the most predominantly occurring themes focus on “conservation” and “education” objectives. Further, Patrick et al. also found that zoo conservation mission statements are most often defined by conservation “practice or advocacy.”
Zoo conservation advocacy is generally defined as supporting stewardship and promoting awareness of conservation issues related to wildlife and wild spaces (Patrick et al., 2007). Zoo conservation practices include: veterinary care for wildlife diseases; in situ and ex situ research to protect animals or ecosystems; fundraising; habitat protection and restoration; and species breeding and reintroductions (AZA, 2015; CAZA, 2015; Patrick et al., 2007; Rabb, 1994 and 2004; Rabb & Saunders, 2005; WAZA, 1993). To help illustrate the scope of the conservation efforts of zoos and aquariums accredited by AZA, their website reports that:

In 2012, AZA-accredited institutions provided $160 million in support of approximately 2,700 conservation projects in more than 115 countries. Additionally, zoo and aquarium scientists contribute to hundreds of conservation, biology, and veterinary science publications.

Other commonly cited zoo conservation initiatives include Studbooks, Conservation Action Partnerships, and the Species Survival Plan Program (SSP). The SSP is a program that has operated at AZA accredited zoos since 1981. It can be described as “a long-term plan involving conservation breeding, habitat preservation, public education, field conservation, and supportive research to ensure survival for many of the planet's threatened and endangered species,” with a current operation of “319 SSPs working on behalf of 590 species” (AZA, 2015).

Rabb (2004) describes zoos as having four conservation-related roles: model citizen, wildlife conservationist, agent for conservation, and mentor/trainer. This has been summarized as follows:

As conservation centers, zoos strive to help society achieve a more sustainable and harmonious relationship with nature by doing four things: 1) ensuring that their operations are as environmentally friendly as possible, 2) contributing to the careful management of the earth’s biological resources, which includes captive and wild animal populations and viable ecosystems, 3) inspiring others to celebrate and conserve nature, and to adopt earth-friendly lifestyles, and 4) building human capacity by mentoring and training others. (p. 237)

Educating visitors is also an increasingly important mission for many modern zoos (AZA, 2004 and 2015; CAZA, 2015; Dierking, Burtnyk, Buchner, & Falk, 2002a and 2002b;
Falk, Reinhard, Vernon, Bronnenkant, Heimlich, & Deans, 2007; Patrick et al., 2007), and institutions accredited by AZA must have an education commitment (AZA, 2015). Educational outcomes and the acceptable role of animals in educational activities at CAZA-accredited zoos and aquariums are stated as follows.

The role of animals in any particular educational activity in zoos and aquariums is acceptable only if the program promises to contribute to the understanding of fundamental biological and ecological principles; the development of knowledge that can reasonably be expected to benefit the animals, their environments, and humans; or that contributes to the understanding of environmental principles and issues with the goal of changing human behavior. These are outcomes of the process we define here as education. (CAZA, 2015)

Patrick et al. (2007) found that out of the 136 zoo mission statements reviewed in their study, 131 had identified education as a mission objective. These statements placed varying degrees of emphasis on affective, cognitive, and general education goals through the use of terms such as: instill/inspire/encourage; promote/cultivate/foster; understanding organisms; knowledge of the world; understanding of human impact; discover/explore; and create/develop (Patrick et al., 2007, p. 56).

For many zoos, educational efforts have more recently focused on conservation, and have shifted from focusing on primarily cognitive goals (i.e., teaching animal facts), to including more affective/attitudinal goals (e.g., instilling caring for animals) and behavioural goals (e.g., inspiring conservation action) for visitors (AZA, 2004; Dierking et al., 2002a and 2002b; Falk et al., 2007). This direction in zoo-based education appears to be supported by the general visiting public who report an interest in having entertaining, yet meaningful visits to zoos; a general interest in conservation issues; and an interest in knowing what they can do to help. As a result of these shifts in zoo-based education, zoos are increasingly interested in exploring ways of impacting conservation-related behaviour among their visitors (AZA, 2004).
It is argued that zoos and aquariums are the ideal place for making meaningful connections to wildlife, as they offer visitors the unique opportunity to have up-close-and-personal experiences with wildlife (AZA, 2015; CAZA, 2015; Dierking et al., 2002b; Falk et al., 2007; Swanagan, 2000). Further, it has been proposed that connections to wildlife will aid in reaching conservation education goals for visitors. This opportunity is perceived to be significant because “with the increase in urbanization and technology, people are increasingly separated from authentic experiences with the natural world while exposure to superficial representations of nature has increased” (AZA, 2004, p. 4).

One might be cautious, however, in assuming that a strong connection to nature will aid in delivering conservation messages. In a study of visitors to a butterfly conservatory, Pedretti and Soren (2006, p. 95) reported “a disconnect between what staff wanted and expected visitors to grasp about environmental messages, on the one hand, and visitor comments about ecology and environmental messages, on the other.” The butterfly conservatory personnel believed they were delivering strong messages about conservation in the hopes “that action related to the environment and ecology would follow” (Pedretti & Soren, 2006, p. 93). Visitors had many more comments about interactions with butterflies, their emotions, and the aesthetic appeal of the conservatory, than about conservation-related issues.

Several suggestions for maximizing the impact of conservation education efforts on zoo and aquarium visitors can be found in the literature. This includes: using exhibits containing explicit conservation messages; targeting a variety of audiences; providing concrete suggestions for taking conservation-related action back home; increasing meaningful staff and volunteer interactions; and setting up touch-tables and other interactive exhibits where possible to allow for close contact with live animals (Dierking et al., 2002b; Lindemann-Matthies & Kamer, 2006; Swanagan, 2000).
Collaboration with schools and post-secondary institutions is seen as “an essential and vital part of an effective program in conservation education” by accredited zoos and aquariums (Wagner, 2002, p. 5). This is evidenced by the multitude of elementary, secondary, and post-secondary level programs, summer courses for teachers, specialized school-oriented exhibits, and educational camps available to school groups, all of which go beyond reaching out to the general visiting population (AZA, 2015; CAZA, 2015; Chiszar et al., 1990; Churchman, 1987). Zoos often identify local science curriculum expectations and/or standards which correspond to the programs they offer, to help teachers choose the most appropriate program for their students (AZA, 2015; Toronto Zoo, 2015).

The literature suggests that school-based educators continue to seek opportunities in their communities to find support and enrichment for school-based science curriculum. Informal learning opportunities, such as those experienced at zoos, museums, and science centres are believed to be one such means of complementing the science curriculum taught in schools (see for example, AZA, 2004; Davidson, Passmore, & Anderson, 2009; Rennie & McClafferty, 1995; Sullenger & Turner, 2015; Tofield, Coll, Vyle, & Bolstad, 2003). Generally speaking, student learning in informal settings seems to be enhanced when the visit is well planned, including the use of pre- and post-visit activities, and when aligned with curriculum objectives (Churchman, 1987; Davidson et al., 2009; Rennie & McClafferty, 1995; Tofield et al., 2003).

**The complex identity and roles of zoos.** The multi-dimensional and often contradictory roles of zoos in society make them complex places (Fernandez, Tamborski, Pickens, & Timberlake, 2009; Hyson, 2004). Creating harmony among contradictory missions is one aspect of this complexity. Take for example this recommended strategy intended for AZA-accredited institutions: “Develop models for connecting people and wildlife in situations that don’t compromise animal welfare, that maintain an appropriate balance between focused messages,
fun and animal welfare” (AZA, 2004, p. 10). In this sample directive, zoos are faced with the challenge of balancing entertainment and education, while at the same time maintaining animal welfare. Others have similarly commented on the challenge of balancing the needs of animals versus visitors in zoos. Namely, concerns have been raised as to how to best maintain “private” spaces for animals while still providing zoo visitors with the entertainment of having access to the animals (Fernandez et al., 2009; Ryan & Saward, 2004).

Bertram (2004) sums up the contradictory nature of zoo missions to educate, conserve, and entertain in the following way:

Zoos would argue that in fact they do not keep animals primarily for entertainment, but mainly for conservation and education reasons. Nonetheless, it is undeniable that visitors come to zoos of their own free will for recreation and entertainment, and zoo managers are aware of the need to attract them. (p. 202)

Although zoos acknowledge the importance of the recreation mission and its necessity in generating revenue, in recent years they have moved away from defining themselves as places of entertainment, and have begun redefining themselves as professionally managed zoological parks with a focus on conservation (WAZA, 1993, p. 3). Lindburg (1999) describes how accredited zoos and aquariums are trying to redefine themselves in this way, and how animal welfare concerns are a driving force behind this shift:

It is widely recognized that the original objectives of zoos in maintaining collections of wild animals can no longer be condoned. Modern-day zoos, therefore, have redefined their missions in light of questions about the right to hold animals captive and the relevance and humaneness of this practice. They have done so by aligning themselves with conservationist objectives, a process that has entailed the investment of substantial resources in education, improved training of staff, modernization of exhibits, breeding, and, in some cases, reintroductions, and research designed to improve health, welfare, and propagation efforts. The modern zoo also takes note of the world-wide decline in populations and their habitats and increasingly envisions a time when at least some species will exist only within their confines [Soulé et al., 1986]. For the vast majority of those who labor in the profession, therefore, pride of achievement and a personal sense of fulfillment are commonly found. Indeed, for most it is a pursuit to be nobly and passionately held. (p. 433-434)
Hyson (2004) argues that redefining zoos as conservation centres, rather than places for entertainment, has been historically difficult for three main reasons: 1) the public does not see zoos as devoted to conservation; 2) people visit zoos to be entertained by the viewing of wild animals, not for education; and 3) zoos continually place too much emphasis on the entertainment factor (e.g., naming contests, cuddly mascots, birthday parties).

Hyson (2004) suggests that zoos might move forward in establishing their identity and roles in society by:

. . . more openly and self-consciously embracing the very institutional ambiguity that has so bedeviled them for the past century and a half. After all, “entertainment” at a zoo is a different animal than “entertainment” at a theme park or at a movie theater. The zoo’s emotional appeal derives from the wonderfully (sometimes frighteningly) unpredictable interaction of humans and live creatures: that moment of nose-to-nose contact that produces reactions far more exciting and profound than any rollercoaster or blockbuster film. Zoos need to find more ways to make those human-animal encounters happen and to make them, yes, more entertaining. (p. 250)

He further argues that zoos might want to “think more critically and openly about their function, their image, their place within the broader cultures of education and entertainment” (p. 250). To help achieve this goal, Hyson makes a call for research which aims to develop a more sophisticated understanding of the zoo-going experience by exploring “not just what visitors do and learn at the zoo, but what they think about it before and after their visits (p. 250).” This call aligns well with the research intent of this study to develop a deeper understanding of the participants’ (students, teacher, and zoo staff) perspectives and experiences.

The highly variable nature of individual zoos within the zoo community is another complexity of modern day zoos. Fàbregas, Guillén-Salazar, and Garcés-Narro (2012) describe zoos as a “heterogeneous community” in which members vary greatly in terms of their zoological collection (types and number of specimens); size and location of grounds and facilities; revenue generation; conservation, education, and research activities; personnel practices; affiliations with professional zoo associations; suitability of enclosures for animals;
exhibit naturalization; enclosure security to prevent animal escapes; and animal record keeping.

Fàbregas et al. propose that the zoo community as a whole should make a joint effort to improve the performance of all zoos, with professional zoo associations playing a significant role in achieving this collective goal.

In the fictional novel *Life of Pi*, Yann Martel (2002) writes expressively about the heterogeneous nature of zoos:

> Every animal has particular habitat needs that must be met. If its enclosure is too sunny or too wet or too empty, if its perch is too high or too exposed, if the ground is too sandy, if there are too few branches to make a nest, if the food trough is too low, if there is not enough mud to wallow in—and so many more ifs—then the animal will not be at peace. It is not so much a question of constructing an imitation of conditions in the wild as of getting to the essence of these conditions. Everything in an enclosure must be just right—in other words, within the limits of the animal’s capacity to adapt. A plague upon bad zoos with bad enclosures! They bring all zoos into disrepute. (p. 44)

This quote, although from a fictional source, highlights the very real issue of people’s concerns and objections relating to substandard zoos (ECO, 2012; WSPA & Zoocheck Canada., n.d.). In Ontario, substandard zoos commonly termed “roadside zoos” are found in abundance.

The majority of zoos in Ontario are what are commonly referred to as “roadside zoos.” They are usually small, under-funded, occasionally ramshackle collections of animals that tend to be open seasonally from May until late September or early October and are often advertised by regional highway signs. Some roadside zoos may be nothing more than a few caged animals used to attract travelers to a gift store or garden centre, while others more closely resemble traditional zoos, housing a varied collection of animals available for viewing by a paying public. A few facilities offer interpretive programs, somewhat similar to those available in the larger, better-funded, zoos and outfit their staff and volunteers in much the same manner . . . In recent years, a number of roadside zoos have tried to rebrand themselves as “sanctuaries,” but they often continue to breed, buy and sell animals (something accredited sanctuaries don’t do) and their quality of animal housing and care may still be poor. (WSPA & Zoocheck Canada., n.d., p. 5)

Numerous concerns and issues have arisen from these roadside zoos, including injuries to animals, visitors, and owners of these facilities (see for example WSPA & Zoocheck Canada., n.d., p. 48-52). Professional zoo associations such as AZA distinguish their accredited zoos and aquariums from “roadside zoos” by requiring members to meet or exceed certain professional
standards in areas such as animal care, research, and education (AZA, 2015). It should be noted, however, that accreditation does not guarantee that zoos and aquariums are in fact providing adequate and appropriate care and facilities for animals, as even accredited institutions have been subject to government-led investigations and/or public scrutiny (see for example, ECO, 2012).

**The School Context: Science, Technology, Society, and Environment (STSE) Education**

Another key area of research informing this study is what I have called “The School Context.” The current study can be best placed in the curricular context of secondary school science education, and more specifically, aligning with contemporary approaches which seek to “recognize the importance of broadly conceptualizing scientific literacy to include informed decision making; the ability to analyze, synthesize, and evaluate information; nature of science (NOS) perspectives; the coupling of science, ethics, and moral reasoning; and agency” (Pedretti & Nazir, 2011, p. 604).

The teaching and learning experiences of this study are best situated in the science, technology, society, and environment (STSE, formerly called STS) education framework for teaching school science (see for example, Aikenhead, 1994; Pedretti, 1996, 1999, 2003 and 2005; Pedretti & Nazir, 2011; Solomon, 1993; Yager, 1990). On a practical level, this study fits within STSE-focused curriculum, strategies, and practices. On a theoretical level, this study fits within STSE emphases for teaching and learning school science (e.g., such as within sociocultural, political, value-based and ethics frameworks).

The theoretical underpinnings of this study can be more broadly situated within constructivist learning theory (Yilmaz, 2008). Constructivism as a paradigm or worldview focuses on the nature of knowledge construction and the nature of learning, and proposes that the learner is actively involved in the processes of thinking, learning, and in generating meaning.
and understanding about the world around them (see for example, Fox, 2001; Ornstein & Hunkins, 2009; Richardson, 2003; Yilmaz, 2008). Although constructivism is complex and not easily defined, nor is it seen as a single or unified theory, the following general definition helps to clarify its usage in this study:

Constructivism as a paradigm or worldview posits learning is an active, constructive process. The learner is an information constructor. People actively construct or create their own subjective representations of objective reality. New information is linked to prior knowledge, thus mental representations are subjective. (Learning-Theories.com, 2015)

Based on the work of Boethel and Dimock (2000) and Fox (2001), Yilmaz (2008) proposes the following list as basic assumptions and principles of the constructivist view of learning.

- Learning is an active process.
- Learning is an adaptive activity.
- Learning is situated in the context in which it occurs.
- Knowledge is not innate, passively absorbed, or invented but constructed by the learner.
- All knowledge is personal and idiosyncratic.
- All knowledge is socially constructed.
- Learning is essentially a process of making sense of the world.
- Experience and prior understanding play a role in learning.
- Social interaction plays a role in learning.
- Effective learning requires meaningful, open-ended, challenging problems for the learner to solve.

(p. 168)

Yilmaz also suggests that teachers who align their practice with constructivist learning theory appreciate that students may share a different view of curricula, textbooks, and instructional props and experiences; recognize the importance of discourse; and “challenge students to justify and defend their positions so that they can change their conceptual frameworks (e.g., beliefs, assumptions, and conceptions)”, (p. 169).

The constructivist learning theory definitions, assumptions, and principles presented above inform the instructional practices found in this study, including those within an STSE education framework. In continuing with this section of the literature review I now present a
general overview on STSE education, situate it in the Canadian context, and discuss its implementation and challenges in the science classroom.

**STSE Education Emphases and Strategies**

Pedretti and Nazir (2011) suggest that although no clear definition of STSE education exists in the literature, it can be considered “an umbrella term that supports a vast array of different types of theorizing about the connections between science, technology, society and environment” (p. 603). Pedretti (2003) identifies seven components generally found in STSE education: sustainable development; decision-making; ethics and moral reasoning; personal and political dimensions; critical social reconstruction; nature of science emphasis; and action.

Pedretti and Nazir (2011), in their extensive review and analysis of the literature, developed a framework of understanding for STSE education. They identify six currents which help characterize the nature of STSE education: application/design, historical, logical reasoning, value-centered, sociocultural, and socio-ecojustice currents (p. 607-608). The authors provide details on the emphases, aims, dominant approaches, and example strategies associated with each of these currents in the literature.

Pedretti and Nazir (2011) describe the application/design current as emphasizing connections between science and technology. In this current, example strategies focus on problem-based learning, as well as technological design and construction (p. 607). They characterize the historical current as emphasizing the nature of science (NOS) in terms of understanding science as a human endeavor and examining scientific ideas and work in historical sociocultural contexts. Example strategies for this current included role play, simulations, dramatizations, and historical case studies (Pedretti & Nazir, 2011, p. 607). The sociocultural current is characterized by an emphasis on understanding science within a broad social and multicultural context. It also emphasizes an awareness of, and respect for, the views
and knowledge held by traditional and non-Western cultures. Commonly cited strategies found in this current included case studies, use of socioscientific issues, inclusion of alternative knowledge systems, storytelling, and integrated curricula (p. 608).

The emphases and strategies of the remaining three currents identified by Pedretti and Nazir (2011) align most strongly with the teaching and learning context of the current study. The socio-ecojustice current, is characterized by a politicized theme, emphasizing understanding, critiquing, and taking action on STSE-related issues. In this current, emphasis is placed on “the promotion of a certain type of citizenship and civic responsibility of which transformation, agency and emancipation are key features” (Pedretti & Nazir, 2011, p. 617). Similarly, Hodson (2003), in advocating for sociopolitical action in school science, calls for “a more overtly politicized form of science education, a central goal of which is to equip students with the capacity and commitment to take appropriate, responsible and effective action on matters of social, economic, environmental and moral-ethical concern” (p. 652).

Pedretti and Nazir identified the following strategies as being common to the socio-ecojustice current: use of socioscientific issues, case studies, community projects, debates; developing and implementing action plans; and using current local and global situations as teaching opportunities (p. 617). Specific activities used in this current can include “developing action plans, changing their own habits, educating others, lobbying for change, raising funds, planting trees, and litter cleanups” and “are meant to empower students to make democratic choices” (p. 618). Many of these strategies and activities suggested by Pedretti and Nazir are utilized for teaching and learning about zoos and biodiversity conservation in my study.

According to Pedretti and Nazir (2011), the logical reasoning current focuses on developing an understanding of, and decision making skills related to, socioscientific issues through a consideration of scientific evidence and logical thinking (p. 607). This current directly
aligns with the curricular context of my study in that both acknowledge the “interactions between science, technology, society and environments are the source of many controversial socioscientific issues” (p. 612) and that these issues can be used as a tool for teaching. Pedretti and Nazir suggest that in the logical reasoning current, “issues-based education requires student competence in several complex cognitive tasks including understanding multiple perspectives, critical thinking, and decision making” (p. 612). In addition to using socioscientific issues, other sample strategies cited as commonly used in this current are: risk/benefit analysis, stakeholder analysis, argumentation models, decision-making models, and debates (p. 607). These emphases and strategies overlap with those employed in the unit of study in my case.

Similar to the logical reasoning current, the value-centered current also emphasizes an issues-based education, however the latter focuses on “highlighting science as a value-laden enterprise” (Pedretti & Nazir, 2011, p. 614). The authors further describe the value-centered current as:

. . . enhancing student understanding and/or decision making about SSIs [socioscientific issues] through an explicit consideration of ethics and moral reasoning. The overall aim of science education here seems to be the promotion of citizenship and civic responsibility through the transaction of ideas. Activities within this current tend to target students’ moral and emotional identities to stimulate cognitive and moral development. As such, the dominant approaches are affective, moral, logical and critical. (p. 614)

A significant literature base exists on promoting values-focused approaches in science education (see for example Corrigan, Dillon, & Gunstone, 2007). The work of Robottom (2012) supports the value current in STSE, stating that science involves a consideration of not just scientific data, but also subjective value judgments. He likewise advocates for using socioscientific issues as a teaching tool to help students view science in a broader context.

These issues involve human value judgements among competing interests some of which are clearly social/cultural concerns that entail philosophical questions along the lines of “Which interest should we accept as the most compelling at this time and place?” . . . Clearly, the resolution of philosophical questions such as these, while usefully informed
by appropriate scientific data, can never be determined by solely scientific data: they require adequate community debate that weighs carefully the options of actions of certain types in a specific time/space context, and (ultimately) entail a highly subjective value judgement. (p. 102)

Pedretti and Nazir (2011) suggest that the following strategies are commonly affiliated with the value-centered current: case studies, use of socioscientific issues, use of moral philosophical frameworks, values clarification and moral decision making (p. 607). The authors identify two specific models for a value-centered approach to science education. In the first model, The Salters-Nuffield Advanced Biology (SNAB) program is a unit of study framed around a particular issue or case study that allows students to explore various value positions. Students are provided with an ethical framework with which they can critically analyze these positions through debate and discussion, and are then encouraged to form their own position on the issue or case. Students are encouraged to view each other’s value systems as equally valid and personal.

The second value-centered approach to STSE education referenced by Pedretti and Nazir (2011) is the socioscientific issues (SSI) model. In the SSI model established by Zeidler and others (see for example, Zeidler & Nichols, 2009), students address a specific science-related problem through the framework of cognitive moral development. The SSI approach has been defined as follows.

Socioscientific issues (SSI) involve the deliberate use of scientific topics that require students to engage in dialogue, discussion, and debate. They are usually controversial in nature but have the added element of requiring a degree of moral reasoning or the evaluation of ethical concerns in the process of arriving at decisions regarding possible resolution of those issues. (Zeidler & Nichols, 2009, p. 49)

Pedretti (2003) also offers the following examples of possible SSI topics as teaching tools within the STSE framework: genetically modified foods, cloning, nuclear power, ozone depletion, reproductive technologies, and pollution, among others (p. 220). Benefits of the SSI model include helping students to recognize the complexity of socioscientific issues, and
encouraging them to consider multiple perspectives on these issues (Sadler, Barab, & Scott, 2007).

In a similar vein, Hodson (2003) advocates for a four-leveled science curriculum which broadens the science curriculum. His model includes many of the same emphases and strategies previously described in the STSE currents and can be summarized as follows:

**Learning Science and Technology**: acquiring and developing conceptual and theoretical knowledge in science and technology, and gaining familiarity with a range of technologies.

**Learning about Science and Technology**: developing an understanding of the nature and methods of science and technology, an awareness of the complex interactions among science, technology, society and environment, and a sensitivity to the personal, social and ethical implications of particular technologies.

**Doing Science and Technology**: engaging in and developing expertise in scientific inquiry and problem solving; developing confidence and competence in tackling a wide range of ‘real world’ technological tasks.

**Engaging in Sociopolitical Action**: acquiring the capacity and commitment to take appropriate, responsible and effective action on matters of social, economic, environmental and moral-ethical concern.

(Hodson, 2003, p. 658)

Specific strategies adhering to an STSE framework encourage students to explore the social, political, economic, and/or ethical issues related to science, technology, and the environment can take many forms. Some of these strategies have already been suggested, such as: debates or town hall meetings, presentations, historical perspectives, a culminating task or performance, issues-based approaches, and case studies. In addition, utilizing informal learning opportunities (such as visits to zoos, science centres, and museums) is another strategy that aligns with the goals of STSE education (see for example, Hodson, 2003; Pedretti, 1999 and 2005; Pedretti & Forbes, 2000; Ramey-Gassert & Walberg, 1994).

For instance, research done by the CRYSTAL Atlantique (Centre for Research in Youth Science Teaching and Learning) team suggests that formal school and informal learning partnerships can promote a broader exposure to science, mathematics and technological culture for students (Sullenger & Turner, 2015). This includes encouraging students to learn about
science and related issues through “social, political, and ethical considerations” (Sullenger, 2006, p. 15). After engaging in multiple research projects involving collaborations among academics, scientists, informal educators, historians, elementary and secondary school teachers, the CRYSTAL research team found a need for continued dialogue and research that develops understanding around the roles and challenges of informal science learning, particularly in relation to the idea of the culture of science (Sullenger & Turner, 2015). This call aligns well with the aims of my study, namely, to develop a deeper understanding of the participants’ perspectives and experiences relating to a unit of study that combines a formal setting (the classroom) and an informal learning setting (the zoo).

**STSE Education in the Ontario Context**

The *Common Framework of Science Learning Outcomes, K-12: Pan-Canadian Protocol for Collaboration on School Curriculum* (Council of Ministers of Education, Canada, 1997) is a framework for the vision of science literacy in Canada and is intended to provide general and specific outcomes for use in forming provincially-based science curricula. This framework is built on four foundational statements, the first of which endorses science, technology, society, and the environment (STSE) education emphases:

**Foundation 1:**

**Science, technology, society, and the environment (STSE)**

Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

This foundation statement is the driving force of the framework. Many learning outcomes presented in this document flow directly or indirectly from the STSE domain. This foundation focuses on three major dimensions:

- the nature of science and technology
- the relationships between science and technology
- the social and environmental contexts of science and technology

(Council of Ministers of Education, Canada, 1997)

In following recommendations from this framework, Ontario’s most recent secondary school science curriculum was organized by three goals, the first of which is STSE education:
1. to relate science to technology, society, and the environment
2. to develop the skills, strategies, and habits of mind required for scientific inquiry
3. to understand the basic concepts of science

(Ontario Ministry of Education and Training, 2008b, p. 4)

The STSE education component of the Ontario secondary science curriculum formed the basis for the instructional activities found in this study. This included placing importance on taking students out of the classroom to expand their learning opportunities (e.g., the zoo); as well as, encouraging students to think critically about issues, hone personal opinions, and take personal action. The following excerpts from the Ontario secondary science curriculum highlight these emphases:

The increased emphasis on relating science to technology, society, and the environment (STSE) within this curriculum document provides numerous opportunities for teachers to integrate environmental education effectively into the curriculum. The STSE expectations provide meaningful contexts for applying what has been learned about the environment, for thinking critically about issues related to the environment, and for considering personal action that can be taken to protect the environment. Throughout the courses and strands, teachers have opportunities to take students out of the classroom and into the world beyond the school, to observe, explore, and investigate. One effective way to approach environmental literacy is through examining critical inquiry questions related to students’ sense of place, to the impact of human activity on the environment, and/or to systems thinking. (Ontario Ministry of Education and Training, 2008b, p. 38)

Students use critical thinking skills in science when they assess, analyse, and/or evaluate the impact of something on society and the environment; when they form an opinion about something and support that opinion with logical reasons; or when they create personal plans of action with regard to making a difference. In order to do these things, students need to examine the opinions and values of others, detect bias, look for implied meaning in their readings, and use the information gathered to form a personal opinion or stance. (Ontario Ministry of Education and Training, 2008b, p. 40)

Additional support for STSE education emphases in Ontario curriculum comes from the Science Teachers’ Association of Ontario (STAO) and Science Coordinators’ & Consultants’ Association of Ontario (SCCAO). They position that “science and technology exist in social and environmental contexts” and “are affected by the values and choices of individuals and governments, and in turn have a significant impact on society” (STAO & SCCAO, n.d., p. 2). STAO and SCCAO further position that “students in science courses should be given ample
opportunities to develop a sound understanding of science, the Nature of Science, and the interrelationships among science, technology, society and the environment” (p. 2). Some specific examples of these interrelationships are suggested as topics of study, including the impact of burning fossil fuels on global warming, and associated political and scientific debates relating to consumption and emissions (p. 2).

**STSE Education Implementation Challenges**

Bringing STSE education emphases and strategies into practice in the science classroom can present challenges for educators (Hodson, 2003; Pedretti, 2003; Pedretti, 2005; Pedretti & Nazir, 2011; Tsai, 2002). Some such challenges may be lack of time or resources; assessment issues; lack of support from colleagues, administrators, parents, and/or students (Pedretti & Nazir, 2011; Tsai, 2002). Hodson (2003) cautions that teachers’ confidence and competence may also be challenged when teaching science in a way that exposes values, ethics, controversy, and politicization:

> Making the kind of changes to the curriculum advocated in this article will not be easy. Much that I have suggested is likely to be disturbing to science teachers, severely testing both their competence and confidence. Traditionally, science education has dealt with established and secure knowledge, while contested knowledge, multiple solutions, controversy and ethics have been excluded. Accommodating to what some teachers will perceive as loss of teacher control and direction will be difficult. (p. 664)

Pedretti and Nazir (2011) similarly speak to the potential challenges of teaching within an STSE framework, stating that educators may face “worrying about ethical implications, their own competence, and the long-term consequences involved in overtly teaching in such a manner” (p. 618).

**Educator positioning.** How to position oneself on an issue is one specific challenge faced by teachers when teaching within an STSE education framework. This is particularly true when teaching about sensitive or controversial topics, or when using socioscientific issues as a teaching tool.
Much debate over what is considered to be “controversial” curriculum exists in the literature. Dearden’s (1981) epistemic criterion for ‘controversial’ is commonly cited in the literature (e.g., Hand, 2008; VanRooy, 2004; Warnick & Smith, 2014). The criterion can be summarized as follows: “a matter is controversial if contrary views can be held on it without those views being contrary to reason” (p. 38). In other words, a curriculum topic is considered to be controversial if multiple reasonable views can be held on the subject matter. Conversely, a topic is not considered to be controversial if only one reasonable view exists (e.g., racism, bullying). Dearden defines “reason” as “not something timeless and unhistorical but the body of public knowledge, criteria of truth, critical standards and verification procedures which at any given time has been so far developed” (p. 38). He therefore acknowledges that a topic might be at one time controversial, and at a later time settled (for example, the shape of the earth).

VanRooy (2004) offers a more practical definition of controversial topics in the science curriculum. She defines controversial science curriculum as “topics, problems, and reports that center on the social, moral and ethical aspects of how science affects the lives of people and the environment in which they live” (p. 197). She cites numerous examples of such curriculum topics, including nuclear energy, use of pesticides, mining, energy use, global warming, cloning, and the protection and breeding of endangered and threatened species. VanRooy further describes the nature of controversial issues as being such that they evoke diverse opinions among individuals or groups based on empirical evidence and/or value judgements.

Pedretti (1999) highlights similar challenges facing educators when teaching about sensitive topics or controversial issues in the following passage:

Teaching toward an understanding of scientific knowledge and social responsibility through controversial issues can be daunting. For example, whose values (if any) do teachers promote? What kind of intervention do teachers plan for? How do teachers
position themselves amidst controversy and multiple perspectives in the classroom? (p. 180)

No clear answer exists in the literature on how to position oneself when teaching about controversial issues (see for example, Hand, 2008; Hand & Levinson, 2012; Oulton, Dillon & Grace, 2004; VanRooy, 2004; Warnick & Smith, 2014). Using Dearden’s (1981) epistemic criterion of controversial, Hand asserts that teaching something as controversial “is properly contrasted with teaching it as settled or resolved” (p. 213). He specifically refers to “teaching-as-settled” as “directive,” and “teaching-as-controversial” as “non-directive.” In other words, a topic can be taught as settled if only one rational view on an issue exists (e.g., racism, bullying), and therefore a direct and opinionated approach to the topic should be taken by the teacher. However, when a topic is deemed legitimately controversial because more than one rational view exists, then a non-directive or open approach should be taken, and the teacher should remain neutral on the issue.

An alternate but overlapping framework from VanRooy (2004) suggests that when bringing a controversial issue into the science classroom, teachers assume one of three roles: neutrality, commitment, or balance. In the commitment role, as with the directive approach described above, the teacher “makes their position known at some appropriate time during the lesson” (p. 200). In the role of neutrality (in likeness to the non-directive approach described above) the “teacher either gives support for all viewpoints or withholds support for any viewpoint” (p. 200). The third and final position proposed by VanRooy is the balanced role, in which the teacher “presents all alternative views” to the students (p. 200).

More recently, Warnick and Smith (2014) proposed the “soft-directive” approach to teaching about controversial issues. Warnick and Smith describe the soft-directive approach as one which builds on Hand’s (2008) directive approach to teaching about controversial issues by adding an element of “openness to being challenged on an explicitly endorsed position” (p.
Warnick and Smith also define the soft-directive approach as one in which the teacher shares his/her reasoning for adopting a particular view on an issue, thereby teaching the students a process by which they may use to form their own views. In other words, the soft-directive teaching approach can be described as having three criteria:

1) the teacher endorses a certain view;

2) the teacher allows for disagreement, and in fact, encourages critical analysis of his/her view; and

3) the teacher shares how he/she has developed his/her view.

Although educators still question how best to position themselves when teaching sensitive or controversial curriculum, a common aim is that we strive to “prepare our children to engage in controversy and conflict in peaceful, thoughtful, and critical ways” (Pedretti, 1999, p. 180).

Educator influence. A related challenge for educators comes from finding a balance between indoctrination and empowerment for students. Pedretti and Nazir (2011) relate this challenge to the socio-ecojustice current specifically, but arguably this connection could be made across other areas of STSE education as well, particularly those which make use of socioscientific issues as a teaching tool.

Yet despite its apparent appeal, this current in STSE education faces considerable challenges. Indeed, some teachers seem to agree with Roth and Calabrese-Barton (2004) who characterize teaching within the socio-ecojustice current as “dangerous teaching.” In addition, many are wary of the ideological paradox that seems to exist within this current, which on the one hand emphasizes emancipation and empowerment, but on the other insists that this can only be achieved within a very specific philosophical framework. A major challenge facing teachers who choose to work within this current seems to be in negotiating this tension and designing activities that navigate the fine line between indoctrination and empowerment. (p. 618)

Similar concern related to teacher influence and power relationships with students in the classroom can be found elsewhere in the literature (see for example, Davidson et al., 2009; Warnick & Smith, 2014). It is a key concern in critical theory which calls for an examination
of power relationships in the classroom (see for example, Freire, 1998; Giroux, 2004). In the context of teaching about a controversial issue in the classroom, Warnick and Smith express the following specific concerns:

When the teacher endorses a position, directly or indirectly, many things in the educational dynamic change, and not all for the better if educating for reason is the normative aim of education. If a teacher’s endorsement were to end up influencing a student to accept one position over another, it would be because the teacher is either influencing by social authority (the power of “the authorities” to exact obedience) or by epistemic authority (the power of being an expert on something). If the student is influenced because the teacher is exercising social authority, then the student seems to have been led away from a life of reason. Teacher endorsements add an element of coercive power. The message is that the teacher prefers you to believe a certain way, and since the teacher has power over you, you therefore better accept that position. (p. 236)

To address these concerns, Warnick and Smith (2014) propose the soft-directive approach which aims to lessen “worries about coercion in directive teaching . . . (although, granted, they do not completely evaporate)” (p. 241). In this way, students are not asked to adopt the teacher’s view, but rather they are given an example of how a reasonable view might be developed and are encouraged to think critically about multiple views (including the teacher’s view).

**Perspectives on Zoos and Related Teaching and Learning Experiences**

The third and final key area of literature informing this study is that which focuses on people’s perspectives on zoos and related teaching and learning experiences. This section of the review begins with a look at arguments “for” and “against” zoos, followed by research on perspectives on zoos amongst the general public. I then narrow my review to a focus on research relating to the perspectives and experiences held by the three main participant groups in zoo-based teaching and learning experiences—student, teacher, and zoo staff.
For or Against Zoos?

The passionate debate “for” and “against” zoos can be found in a multitude of public forums from scholarly journals and conferences to popular media like books, television, radio, and the Internet. The complex relationship between zoo animals and people, the justification for the existence of zoos, and the rights and welfare of zoo animals are most often at the root of this ubiquitous debate. A large literature base exists on this topic, but for the purpose of this review I have provided a brief overview of literature most relevant to this study.

Those who take an “against-zoos” stance argue that the rights and/or welfare of zoo animals are compromised (see for example, Bowman, 2008; Hallman & Benbow, 2006; Lindburg, 1999; Malamud, 1998; Mullan & Marvin, 1999; Wickins-Drazilova, 2006). This stance stems from philosophical, moral and/or ethical positions relating to concerns about zoo animal health, longevity, reproduction, as well as limitations imposed on natural behaviours, freedom and choice, and dignity through confinement in captivity. Proponents of the against-zoos stance question the very existence of zoos, and critique the benefits of zoos proposed by the pro-zoos stance (i.e., research, education, and conservation contributions). Some critics of zoos further argue that zoos promote human dominance over non-human animals and an unnatural connection with wildlife, thus arguing for the elimination or revolution of zoos, or for the promotion of alternative exposure to wildlife (e.g., in natural spaces or through media such as books, television, and the Internet).

Lindburg’s (1999) commentary on Zoos and the Rights of Animals reflects on the “rise of philosophically driven activism that has profoundly altered the way society views these [human-animal] relationships” and the zoo community (p. 433). He delves deeply into political and ethical ideologies and actions stemming from animal rights groups as they relate to zoos.
Lindburg suggests that the following specific issues most commonly cause opposition to zoos from the animal rights community:

- the conditions under which animals are kept, often precipitated by some unusual event such as an escape or an accidental death, and commonly expanded into a challenge of the legitimacy of holding any animals captive
- euthanasia generally, but particularly as relates to the disposal of genetic surplus or highly sentient individuals
- the feeding of live prey and, in some cases, whole animal carcasses
- transfers of individuals between zoos, particularly when social relationships that are believed to have attributes in common with those of humans are ruptured as a result
- the use of animals in entertainment, especially performing animals
- bringing new animals in from the wild to augment captive holdings or to start new breeding programs
- the employment of invasive technologies such as embryo manipulation or exogenous hormonal stimulation in breeding efforts
- all research involving animals, even when it is the health and longevity of animals that stand to benefit

(p. 440)

In contrast to these views, those who take a “for-zoos” stance argue that the benefits of zoos, namely contributions to recreation, research, education, and conservation, outweigh the costs (see for example, AZA, 2004 and 2015; Bertram, 2004; CAZA, 2015; Chiszar, et al., 1990; WAZA, 2015). Supporters argue that zoos perform critical and necessary roles in society and in particular serve to protect threatened and endangered wildlife that might otherwise not survive due to growing threats in today’s world. They further argue that zoos offer a unique firsthand connection to wildlife that for many people is only possible through zoos, and further that these connections are more meaningful than exposure to wildlife through media such as books, television, or the Internet. For example, Bertram (2004), a zoologist who has worked in zoos for 24 years, lends support for zoos stating that they play a crucial and necessary role in conservation and in education.

In an ideal world too, zoos would be unnecessary; there would be no conservation problems, and people could harmlessly go anywhere to admire wildlife. But in the real world, zoos carry out an important function, while giving pleasure, inspiration and enlightenment to a great many people. Of course they can always do better, as can any organization, and should be supported in their efforts to do so. They are a powerful force
for conservation and a major force for good, in a world that elsewhere is regrettably becoming much less good for wildlife. (p. 205)

Bertram (2004) further argues that although zoos should continually seek opportunities to improve, the public often holds views of zoos based on naïve or limited conceptions which differ from the actual principles and practices found in modern day zoos. To illustrate this point he identifies twelve objections to zoos commonly held by the public and shares alternative ways of thinking about these objections. For example, Bertram cites the public’s concern that the reintroduction of zoo animals into the wild is rarely successful. Bertram then shares some documented cases of successful reintroductions done by zoos to refute this claim. He offers further insight into this situation, stating that perhaps reintroductions were overemphasized or overly publicized by zoos in the past, when in reality it is a complex process. Bertram repeats this process for eleven other common objections to zoos, thereby providing the reader with alternative ways of thinking about zoos.

The zoo community acknowledges the debate “for” and “against” zoos, as well as changing public attitudes and knowledge relating to zoos and the human-animal relationship. For example, Lindburg’s (1999) article *Zoos and the Rights of Animals* was written specifically for the purpose of informing the zoo community of the animal rights movement and its implications for zoo professionals. Further acknowledgement of this shift is found in a document entitled *Conservation Education Trends Report – 2004* (AZA, 2004). The following trends relating to “Public Attitudes and Knowledge” toward zoos were noted among AZA-accredited zoos and aquariums:

**Trend VIII** Fundamentalist belief systems are emerging that challenge the impact of our conservation messages (e.g., animal rights’ groups).

**Trend IX** The public’s concern for animal welfare is increasing.
**Trend XI** There is an increasing focus on accountability amongst the media, funders and the general public (i.e. fiscal responsibility, evaluation of impact).

(AZA, 2004, p. 4)

Implications and strategies for addressing each of these issues are suggested for the zoo community in this report, including calls for additional research. For example, in addressing Trend VIII, zoos are encouraged to consider the following implications and strategies:

**Implication**
- Fundamentalist beliefs/groups challenge our messages and the role of AZA Zoos and Aquariums.

**Strategy**
- Develop key messages related to controversial topics/sensitive issues and staff training related to the delivery of these messages. Examples include: responses to questions related to the impact of AZA Zoos and Aquariums, the keeping of animals in captivity, the facility’s position on evolution, euthanasia, etc.
- Collect and/or commission research which will help us address:
  - True prevalence of animal rights’ beliefs and concerns amongst the general public
  - Overall impact of a visit to an accredited Zoo or Aquarium
  - True prevalence of creationist beliefs
- Strategize on research results from earlier Animal Welfare Committee research and work with the NAC to develop messages and disseminate.

**Implication**
- This will require a pro-active approach to sharing messages with audiences.

**Strategy**
- Assess national and regional dynamics.
- Be proactive about communication to educate people about the circle of life

(AZA, 2004, p. 12)

Rabb and Saunders (2005) similarly respond to the challenge of an increase in public concern around animal welfare and animal rights in zoos.

. . . to succeed as conservation centres, zoos and aquariums need a much better understanding of people’s fundamental psychological relations to animals and nature. Furthermore, we believe that it is essential for us to foster caring concerns and caring behaviour for animals and nature if we are to stay in business, and if we are to carry out the world conservation strategy of *Caring for the Earth* (IUCN/UNEP/WWF, 1991).

(Rabb & Saunders, 2005, p. 2)

These authors suggest that zoos need to develop a better understanding of people’s relations to animals and nature, and to continue to foster an ethic of caring for animals and nature.
General Public Perspectives

Finlay, James, and Maple (1988) examined people’s perceptions of wild and zoo animals in relation to their environmental context using eleven adjective pairs, such as harmful-harmless, free-restricted, tame-wild, and active-passive. The participants were shown pictures of eight species of animals—in the wild, in a natural-looking zoo enclosure, and in a caged zoo enclosure. The researchers found that zoo animals were more often viewed as restricted, tame, and passive, compared to animals pictured in the wild, which were seen as more free, wild, and active.

In addition, Reade and Waran (1996) conducted a two-part study in which they explored perceptions of zoos and zoo animals held by the general public (non-visiting members of the public) and by zoo visitors. The participants were asked to give ratings on a scale from one to five to reveal their point of view on various topics and issues related to zoos and zoo animals including: the importance of each of the four main roles of modern day zoos (i.e., entertainment, research, conservation, and education); perception of captive animals; motivation to visit a zoo; and opinions on zoo enclosure design.

Reade and Waran (1996) found that the non-visiting public held more negative perceptions (i.e., perceiving zoo animals to be bored and sad) as compared to those interviewed within the zoo who held more positive perceptions of zoos (i.e., perceiving zoo animals as more well-kept, happy, excited, and less bored). Both the general public and zoo visitors indicated that the housing of captive animals in natural-looking enclosures was more favourable.

Another finding from Reade and Waran’s (1996) study is that the general public regarded conservation as the most important role, and entertainment as the least important role, of modern day zoos. Drawing from these findings the researchers suggest that people are beginning to see zoos as “important conservation institutions” (p. 115). These findings align
well with how zoos perceive themselves – as evolving from simple menageries into complex, professionally-managed zoological parks focusing on conservation (WAZA, 1993). Reade and Waran also reported that although some visitors had stated that they saw zoos as conservation centres, their actual motivation for visiting the zoo was primarily for recreation. In fact, none of the zoo visitors specifically stated that the reason for their zoo visit was to support zoo conservation efforts, and only a few (4%) stated that their reason for visiting the zoo was to be educated. Ryan and Saward (2004) similarly reported that zoo visitors were more interested in visiting the zoo for entertainment rather than learning about wildlife.

In a study by Tofield et al. (2003), zoo visitors at a modern and professionally-managed zoo were asked to share perceptions of exhibits and found that “both younger and older visitors seemed less concerned about exhibit design with the most critical audience being those aged 21 through 41 years” (p. 79). Visitors were also asked to rate selected animals “on a seven point scale from very happy to very unhappy” (p. 80), and results suggested that visitors perceived active animals as happier than inactive animals. Most visitors (81%) reported their main purpose for visiting zoos as entertainment, but also reported that they viewed education (59%), protection of endangered species (24%), and breeding programs (9%), as being roles of zoos (p. 82).

After an extensive review of zoo-based research, Dierking et al. (2002b) similarly reported that people do not consciously think of zoos as conservation organizations, and suggest that informing people of zoos’ roles in conservation is but one of many important tasks for modern day zoos. Dierking et al. also reported that visitors perceive education about animals, environmental problems, and/or nature as being a benefit of visiting zoos.

A common theme in the literature is that although the public generally sees zoos as places for recreation, people are beginning to acknowledge other roles of zoos, namely
contributing to research, conservation, and/or education. One of the aims of this study is to explore how the participants in this case view these roles of zoos.

**Student Perspectives**

Tofield et al. (2003) reported that secondary school students reflecting on a one-day visit to the zoo engaged in discourse about exhibit design relating to animal welfare concerns. Some examples of student quotations cited by Tofield et al. to support this finding include: “I thought the cheetah enclosure was really terrible. It’s far, far, far, too small”; “I mean it was just planks and stuff, and basically that’s just like showing them off and putting them on show and trying to get them to perform for everyone so that everyone can have a good gawp at them”; and “The enclosures were too close to each other and they were right beside each other and I thought that really sucked” (p. 95).

Tofield et al. (2003) concluded that the students were “developing an understanding of animal needs and welfare, and a surprisingly sophisticated view of exhibit design” (p. 96). Student discourse on zoo animal welfare appears to indicate that students in the Tofield et al. study held concerns about zoos. I aim to build on the work of Tofield et al. by probing more deeply into the concerns and views held by the students participating in my study.

Focusing on students’ ideas about zoos and animal conservation, Greaves et al. (1993) administered a questionnaire to 347 students ranging in age from 11 to 16 years. They also found that 31% of the students agreed with keeping animals in zoos without qualification, using words like “good” to describe zoos (p. 56). Positive attitudes stemmed from their views that zoos protect animals from human activity like habitat destruction and predators; that zoos manage successful breeding programs; and that zoos educate people about animals and conservation. The authors found that 39% of the students disagreed with the captivity of animals
in zoos, using words such as “bad, cruel, and even evil” to describe zoos (p. 56). Negative views stemmed from concerns that zoos confine animals and provide unnatural habitats for animals. Some students agreed with keeping animals captive in zoos only under certain conditions, and/or held mixed views (both positive and negative) towards zoos – what Greaves et al. (1993) call “qualified agreement” (p. 56). For example, the students shared their views that zoos are only suitable for some animals, and that zoos are acceptable only if the animals are receiving proper care. Interestingly, more of the older students fit into the category of qualified agreement with zoos, a finding that Greaves et al. propose is indicative of a more mature outlook on zoos. These older students were better able to weigh out and appreciate conflicting views, holding on to both positive and negative views in what the authors called a “moral tension” (p. 60).

Greaves et al. (1993) bring forth the idea that students’ concerns and objections relating to zoos might be potentially problematic in a zoo-based teaching and learning context. They propose that such views may create a distraction or resistance to learning, and suggest that teachers should be aware of this issue, but responses to views against zoos in an educational setting are not well documented in the literature. This gap in the literature adds support for the research objectives of my study.

A case study done by Davidson et al. (2009) offers insight into students’ perceptions of zoo field trips, as well as the influence of teachers and zoo educators’ practice and learning agendas on learning experiences. Two classes (with students aged 11 and 12 years), from two schools were observed, interviewed, and surveyed about their experiences before, during, and after each class had a visit to a zoo.

It was found that the students placed high value and importance on peer interactions during their zoo field trip, leading the authors to state that “zoo learning was socially embedded”
The authors recommend that social interactions be encouraged among students during field trips in order to enhance their engagement in learning in this environment. The students in one of the two participating classes were encouraged by the classroom teacher to discuss “the pros and cons of zoos” (p. 134) in post-visit classroom activities, and three months later were able to “tell the interviewer whether they thought zoos were good or bad, and why they thought that” (p. 135). Unfortunately, these findings were not reported in the paper. The authors did however suggest that these and other pre- and post-visit classroom activities contributed to the students’ learning outcomes in the affective realm, such as making connections to animals and to their own personal lives and interests.

Davidson et al. (2009) also found that classroom teachers played a significant role in the students’ learning experiences tied to the zoo visit, in contrast to the zoo educators who did not play as large a role. The authors went on to highlight several areas of match and mismatch among students, teacher, and zoo educators. For example, the zoo educators held a desire to teach students about conservation issues, which fell short for one of the classes, as neither the students nor teacher seemed aware of these issues after the zoo visit. Another example of a mismatched area was that the students found aspects of the zoo field trip boring, despite the zoo educators’ attempts to present information that they thought would be interesting to the students. Davidson et al. recommend that zoo educators and teachers work closely together to ensure explicit learning goals so that zoo educators can better understand what teachers and students want and expect from their field trip. They also suggest offering students more freedom and choice while at the zoo to help increase student motivation and engagement in learning. This message is summarized as such:

While none of what we documented as the student perspective was particularly surprising, what is important to note is how these ideas challenge educators to attend more carefully to students’ views of their own learning. Teachers and educators can tap into students’ ideas and perspectives and attempt to achieve better alignment, potentially
yielding greater learning benefits. However, when students’ desires and views are poorly matched or influenced, the learning opportunities will be most likely missed. (Davidson et al., 2009, p. 139)

In effect, Davidson et al. are advocating for more research on what students think, feel, and value in relation to zoo field trips in order to help maximize benefits from these visits. This call further supports my research objectives.

**Teacher Perspectives**

Tofield et al. (2003) interviewed teachers on reasons for selecting (or not selecting) the zoo as a field trip experience for their students. Some teachers reported that they saw zoos as providing educational benefits for their students, but logistical reasons (e.g., distance from the zoo and cost) were cited as reasons for not participating in zoo field trips.

Tofield et al. (2003) also explored the views of two teachers (one elementary and one secondary) in greater depth. The elementary school teacher is cited as viewing the main purpose for visiting the zoo as being “predominately for “entertainment, fun” (p. 86). The secondary school teacher is cited as viewing the zoo as “a place where we can help endangered species” (p. 93), and had an interest in the nature of zoo enclosures and animal welfare. For example, this teacher is cited as having some concerns about zoos, but that “the zoo is making big steps to change the way it is being looked at, so this is one of the reasons I decided to go the zoo” (p. 92). In addition, the teacher “hoped that the students would get to look at what is done for the animals” (p. 93). Tofield et al.’s results seem to suggest that these two teachers held different views on the purpose of a zoo field trip, and that one of them held concerns about zoo animal welfare.

Davidson et al.’s (2009) study focuses on the influential role of teachers on students’ zoo field trip experiences:

The results from this study suggest, at least in these two cases, that classroom teachers have an important role in shaping students’ trip experiences, not only what students do,
but how they view the trip, what they value and focus on, what they see as the purpose of the trip, and what they remember about it” (p. 138).

Although the literature suggests that teachers and their views on zoos have the potential to play a critical role in students’ zoo-based teaching and learning experiences, there are limited studies done in this area. My research aims to build on this gap in the literature.

**Zoo Staff Perspectives**

Tofield et al. (2003) reported on the perspectives of a zoo curator relating to zoos, animal welfare, and the roles of zoos. The curator shared his view that zoos have “three interdependent roles, education, recreation and conservation, all of which must be satisfied for survival given competition for visitor time and wide options available to modern citizens for discretionary spending” (p. 80). The curator placed particular emphasis on the importance of the zoo’s role in conservation education for young children.

The curator also expressed his views on zoo exhibits and enclosures. He felt that the best zoo exhibits were ones which allow visitors to form connections with animals through close proximity to animals and/or by seeing changes in animals, such as seeing them “give birth to young, grow older, and so forth” (p. 80). The curator deemed most exhibit enclosures and animal enrichment programs at his zoo as acceptable in terms of animal welfare, although he did share some specific concerns about some of the exhibits. For example, he shared that “the camel and sun conure exhibits were deemed low-grade and unnatural exhibits, described as ‘small, old and unimaginative’ and some primate exhibits ‘especially the three species of monkeys, the spider monkeys, the capuchins and the lemurs are very cagey’; and “the partially completed African Savannah was seen to be lacking in shelter, described as ‘really unnatural’, although there are plans to upgrade” (p. 81).

Tofield et al. (2003) provide valuable insight into the perspectives on zoos held by one curator but beyond this one study research on zoo staff perspectives and experiences are limited.
Other closely-related articles in the literature focus on: exploring conservation-related outcomes for wildlife park staff (Groff, Lockhart, Ogden, & Dierking, 2005); and zoo staff’s learning agendas for students (Davidson et al., 2009). I believe that the lack of research in this area adds further support for the aims of my study.

**Chapter Summary**

This chapter was a synthesis of three main areas of relevant literature: “The Zoo Context: Zoos Past and Present”; “The School Context: Science, Technology, Society, and Environment (STSE) Education”; and “Perspectives on Zoos and Related Teaching and Learning Experiences.”

In almost all aspects of zoos reviewed in this literature the complex and contradictory nature of these institutions is an embedded and recurring theme. Much debate on the pros and cons of zoos can be found in the literature in support of those who are passionately “for” or “against” zoos. This review has attempted to capture the essence of these views, and has formed the basis for defining the term “multiple views on zoos” in this thesis (see Figure H1 in Appendix H).

In light of the complex and contradictory nature of zoos, I began to question how the participants in my study viewed zoos, and further, how the participants respond to multiple views in teaching and learning situations. I believe that these are significant questions in light of the millions who visit zoos and aquariums annually (AZA, 2015), and given that limited studies exist in this area of research, as has been established through this review. I therefore expanded my review to include research that focused on how educators respond to science curriculum which evokes similar responses to those evoked by zoos, namely curriculum that addresses topics which can be considered controversial or sensitive in nature. This section of the review also positioned my research within the larger curricular context of the STSE education
movement; one which embraces teaching school science with sociocultural, political, ethical, and issue-based emphases and strategies.

Additional support for the direction of my research comes from calls in the literature for more research on the “true prevalence of animal rights’ beliefs and concerns amongst the general public” (AZA, 2004, p. 12), as well as a deeper understanding of people’s voices, perspectives, and experiences related to zoos (AZA, 2004; Hancocks, 2012; Hyson, 2004), including in the context of zoo-based teaching and learning experiences (Davidson et al., 2009; Greaves et al., 1993). Ideas raised by Greaves et al. were relevant to this study, as they caution that concerns and objections relating to zoos may detract from the educational benefits of these institutions, and further, that teachers may benefit from being aware of this potential issue.
CHAPTER THREE: METHODOLOGY

Chapter Three revisits the research intent and describes the theoretical and methodological frameworks used. Specifically, in this chapter I will describe the two main research sites (i.e., the secondary school and zoo); the participating students, teacher, and zoo personnel; and the curricular unit of study. In addition, I will provide justification for the use of case study and narrative, within an interpretive and naturalistic framework. Data collection, including the role of the researcher, and analysis techniques will be described. And finally, limitations and ethical considerations will be openly discussed.

Statement of Intent and Research Questions

Bogdan and Biklen (2003, p. 151) suggest that it is “useful to compose statements that capture the project’s intent.” Further, in qualitative research, “shaping the questions should be one of the products of data collection rather than assumed a priori” (Bogden & Biklen, 1998, p. 49). My research focus was framed around this perspective. In other words, the essence of the project has remained the same although the research questions have evolved over the course of the research project to address emergent research concerns. More specifically, the participants’ concerns about zoos and how these views were addressed in teaching and learning experiences in this unit of study came to the forefront as I immersed myself in the case.

The research intent is to develop a deeper understanding of the participants’ (students, teacher, and zoo staff) perspectives and experiences related to teaching and learning about zoos during a biodiversity conservation unit of study, in a zoo setting and in the science classroom. To meet this objective a case study design was used to investigate a secondary school teacher, his Grade 11 biology class, and zoo staff at a large, professionally-managed zoo within the
context of a biology unit focusing on zoos and biodiversity conservation. The research intent is reflected in the major research questions, as follows:

1. What are the participants’ (students, teacher, and zoo staff) perspectives on zoos?
2. How do the participants respond to multiple perspectives on zoos, in the classroom and at the zoo?

The literature suggests that multiple views on zoos (see Figure H1 in Appendix H) exist among the general public (Finlay, James, & Maple, 1988; Reade & Waran, 1996; Tofield, Coll, Vyle, & Bolstad, 2003) and among students, teachers, and/or zoo staff (Greaves et al., 1993; Tofield et al., 2003). Therefore it was assumed likely that multiple views on zoos would exist among the participants in this study. I felt it necessary to first confirm this assumption, and the first research question addresses this by seeking to provide detail on the views on zoos held by the students, teacher, and zoo staff. Once this is established, I explore the second research question, which is to better understand how the participants respond to these views while engaging in teaching and learning in the classroom and at the zoo. This includes developing an understanding of how the participants respond to challenges, such as when they are faced with views against zoos and educator positioning when teaching about zoos and related issues.

**Research Design Overview**

The project’s intent is well aligned with a qualitative approach to research, which stresses “the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry” (Denzin & Lincoln, 2000, p. 8). This study took an interpretive and naturalistic approach to inquiry, in that the participants were studied in their natural settings for the purpose of exploring their interpretations of the phenomena under study.

As Bogdan and Biklen (1998) point out, in qualitative inquiry “plans evolve as [researchers] learn about the setting, subjects, and other sources of data through direct
examination” and consequently “a full account of procedures is best described in retrospect.” Bogdan and Biklen go on to explain that “it is not that qualitative research design is nonexistent; it is rather that the design is flexible” (p. 49-50). These perspectives helped shape the design of this study.

In brief, a case study research design (Berg, 1998; Bogdan & Biklen, 1998; Creswell, 2008; Hammersley & Gomm, 2000; Stake, 2000; Yin, 1994) was used to document the participants’ (students, teacher, and zoo staff) perspectives and experiences related to teaching and learning about zoos during a unit of study on biodiversity conservation. I spent eight months in the data collection phase of this research project (see Appendix A for research project timeline detailed from August 2006 to March 2007). During this phase, I worked closely with an experienced secondary school science teacher and his 14 students. I observed and recorded field notes on the student and teacher interactions in the classroom and at the zoo; administered a survey to the teacher and students before and after the unit of study; conducted interviews with the teacher and students before and after the unit of study; and collected numerous samples of students’ work. I also conducted interviews with several zoo staff members and collected zoo documents relevant to the zoo staff’s perspectives and experiences. Permission was obtained from the University Research Ethics Board, the participating school board, the principal of the participating school, the zoo, and every individual participant (i.e., the teacher, students and their parents, and zoo personnel) prior to the start of data collection (Appendix B).

**Theoretical and Methodological Frameworks**

**Naturalistic Inquiry**

This study best fits within the paradigm of naturalistic inquiry (Denzin & Lincoln, 2000; Lincoln & Guba, 1985), as it sought to examine, in detail, human experience in a specific context. The participants were studied in their natural settings for the purpose of “attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them”
Lincoln and Guba (p. 187) similarly describe naturalistic inquiry as one which “is always carried out, logically enough, in a natural setting, since context is so heavily implicated in meaning.” They propose the following presumptions about the process of naturalistic inquiry:

1. Naturalistic inquiry is defined at the level of paradigm, not at the level of method (i.e., the methods used in naturalistic inquiry may be qualitative, quantitative, or a combination of these two methods).

2. In most circumstances, we see the use of a human instrument (i.e., making use of methods such as interviews, observations, document analysis, and unobtrusive clues), which is constantly developing.

3. The researcher makes a guiding statement of design prior to implementation of the inquiry (i.e., the emergent nature of this paradigm is not license to a directionless and undisciplined approach to inquiry).

4. The researcher makes every effort to acquaint him/herself with the research site(s) prior to implementation of the inquiry.

(p. 187; pp. 250-251)

All of these presumptions for naturalistic inquiry are embedded in this research study. Naturalistic inquiry was the lens, or paradigm, through which I viewed and interpreted the phenomena under study. Further, the methodology for this study, although compatible with this paradigm, was clearly defined as a separate component of the inquiry.

In this inquiry I saw myself as the human instrument, in which I continuously refined my technique and adapted to unexpected situations as they arose over the course of the research project. Methods compatible with the human instrument, as suggested by Lincoln and Guba (1985), were implemented. This included observing and interviewing the primary stakeholders (i.e., teacher, students, and zoo personnel), and analyzing various documents related to the
phenomena under study. I elaborate on my role in this research study in the “Researcher’s Role” section below.

With respect to the third assumption, I created and shared a research proposal with university faculty prior to engaging in this research. A guiding research plan and statement of intent were clearly proposed, yet, true to the nature of this form of inquiry, emergent ideas came into play over the course of the project, most especially in terms of needing to refine the research questions to better reflect significant themes developing in the case.

As for the fourth assumption, prior to commencing this investigation I spent a great deal of time discussing the project with the teacher in-person at his home and school, as well as over the phone and via email. Time spent with the teacher prior to the commencement of the inquiry was beneficial, as it allowed me to learn a great deal about his teaching methods and beliefs. Further, it allowed us to strengthen an existing comfortable and professional relationship as we knew each other from attending graduate level science education courses together prior to the commencement of the study. I also had a few opportunities to introduce myself to the participating students and position myself in the classroom prior to conducting the first set of student interviews. Further, I spent time with my initial two zoo staff contacts on the zoo grounds and had exchanged information and ideas via email prior to starting this research study. And lastly, I had visited the participating zoo numerous times, with the most recent visit occurring the same year as the commencement of the study.

**Case Study Research Design**

A case study research design fit well with my desire to take a naturalistic approach to this inquiry, as “case study researchers construct cases out of naturally occurring social situations” (Hammersley & Gomm, 2000, p. 3). Creswell (2008, p. 476) defines case study as “an in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection.” Hammersley and Gomm suggest that the following
dimensions are generally characteristic of qualitative case studies (as has been similarly described by others; see for example, Berg, 1998; Bogdan & Biklen, 1998; Creswell, 2008; Yin, 1994):

- investigation of one or a few cases;
- information is gathered and analyzed in great depth;
- the case is naturally occurring, not controlled by the researcher;
- qualitative data is prioritized over quantitative data; and
- understanding of the uniqueness of the case is often sought, rather than wider generalizability or theoretical inference, although there may be some attempts to find wider relevance of the findings.

(pp. 2-4)

The advantage of case study research is that it helps us to “understand complex social phenomena” because it “allows an investigation to retain the holistic and meaningful characteristics of real-life events” (Yin, 1994, p. 3). In other words, “extremely rich, detailed, and in-depth information characterize the type of information gathered in a case study” which in comparison may make other forms of data collection, such as large-scale survey data, “seem somewhat superficial in nature” (Berg, 1998, p. 212). For these reasons a case study research design was chosen for my study. This design allowed for the in-depth examination of one school, one teacher, one class, and one zoo. Further, qualitative data was prioritized over quantitative data in this project, as the objective was to obtain a deep understanding of the specific case under study, rather than to make broad generalizations.

**Researcher’s Roles**

I feel it is important to elaborate on my role in this research project, as it helps to form the methodological framework of the study. My involvement can be best described as a
“participant observer” as I engaged in “firsthand involvement in the social world chosen for study” (Marshall & Rossman, 1999, p. 106). This level of involvement was selected so that I could “hear, see, and begin to experience reality as the participants do” (Marshall & Rossman, 1999, p. 106), and was a conscious and joint decision made by the teacher and me. A full account of my involvement in research-related activities is described in Appendix A.

The teacher fully encouraged my involvement in the planning and implementation of the zoos and biodiversity conservation unit of study, and as a former intermediate science teacher I was keen to assume an active role. I assisted the teacher in locating resources for use in the unit of study and we jointly created the unit. The teacher had previously created two presentations for former students: (i) to introduce students to zoos and multiple ways of thinking about zoos; and (ii) to introduce students to the participating zoo and highlight his expectations during the field trip. He elected to incorporate both of these presentations into our unit of study.

The teacher delivered the teacher-directed component of lessons without my assistance, which gave me the opportunity to observe and make note of his delivery and interaction with the students. During the student-directed component of lessons, we both circulated around the classroom offering help and facilitating discussions among the students. I jotted down field notes describing interactions among the teacher, his students, and me during these activities. The concurrent role of researcher and teacher was at times challenging, and I needed to balance my instructional interactions with writing field notes in my journal. My solution was to write notes in between interactions with the participants whenever possible, and to write additional notes immediately after each class and the zoo visit.

Another aspect of my role as researcher was serving as a liaison between the teacher and the participating zoo. Well in advance of our field trip, I shared the unit of study with zoo staff which aided in the planning of our zoo visit activities. The teacher saw this as an excellent opportunity for collaboration and was open to the zoo staff’s ideas for the field trip. The
activities for the zoo visit were therefore collaboratively planned by the teacher, the zoo staff, and me (these activities are described in the “Curricular Context and Zoo Field Trip” section of this chapter). I also liaised between the students and zoo staff during the time that the students worked on their action projects. Specifically, I shared the students’ zoo-related questions with one of my zoo staff contacts and he gladly offered assistance. These interactions were recorded in the form of field notes.

In summary, as a participant observer I had a number of roles in this research project. I find Pedretti’s (1996) reflections on her roles as a facilitator of an action research project a useful tool to help me summarize my roles. I saw myself in the role of researcher as I was a “facilitator” of the research project, coming to this setting with guiding research questions and goals, and further as “a group recorder” who observed, recorded notes, and probed stakeholders for elaboration on their experiences during one-on-one interviews and informal conversations (Pedretti, 1996). In this role I sought to gather data from multiple sources (field notes, interviews, surveys, and key documents), so that I could strengthen my findings through triangulation of the data. At the same time, I saw myself in a collaborator role, in that I acted as “a resource person” and “a source of personal support” for the teacher, particularly in locating resources for use in the classroom and in liaising with the zoo (Pedretti, 1996). And lastly, I often saw myself in the role of “teacher” as I assisted with instructional activities, such as collaborating with the teacher and zoo staff in the planning of curricular activities, and engaging in these activities with students (Pedretti, 1996).

Recruitment of the Participants and Description of the Case

Creswell (2008, p. 214) defines purposeful sampling as a technique in which “researchers intentionally select individuals and sites to learn or understand the central phenomenon.” As is typical in qualitative studies, a purposeful sampling practice was employed in this study. Since this study aimed to take a naturalistic approach to inquiry I was looking for
student and teacher participants who would be covering topics related to conservation education as part of their regular curriculum and for whom a zoo visit would be a natural fit into their regular program of study. The science curriculum objectives of the participating teacher, for the participating student group, aligned well with this aim. Further, for this study I was looking for a modern, professionally-managed zoo which espoused conservation and education mission objectives, and the participating zoo met these criteria.

Teacher

The recruitment process began with the teacher, who will be referred to as Logan Bennett. Prior to the study, Logan and I met in a graduate level science education course offered at a local university. He was working toward completing a Master of Education degree and I was working on the coursework component of my doctorate. After we had completed several other classes together, I approached Logan to determine if he might be interested in participating in my doctoral research project. After Logan informally expressed an interest in becoming involved, I sought formal permission from his school board and principal (Appendix B).

Demographic and background information on the teacher was gathered through interview and survey questions. At the time of the inquiry Logan Bennett was an experienced educator, having taught for seven years at the elementary school level and for six years at the secondary level. He was the Program Chair of Science at his secondary school, and in this role regularly shared his expertise and leadership with other science teachers. His formal education background included: Honours Bachelor of Science, Bachelor of Education (Intermediate/Senior Biology and Chemistry teaching qualifications), and Master of Education (focusing on science education) degrees, along with several additional qualifications for teachers including an Honours Specialist in Science. His multiple years of teaching and his formal educational background gave him practical and theoretical knowledge of teaching and learning science in
the classroom as well as informal learning sites. In fact, some of Logan’s graduate level study focused specifically on teaching and learning science in informal settings like zoos.

Logan had visited the participating zoo on numerous field trips with former students in years prior to the study. In addition, he had visited the participating zoo and several other zoos in North America with his family in his leisure time. Some of the specific conservation-related actions that Logan had engaged in around the time of the study included participating in a local Water Conservation festival for young children, and supporting the Bruce Trail environmental group. Logan also participated in related experiences such as camping, hiking, boating, and fishing, as well as visiting museums, science centres, conservation areas, and provincial/national parks.

**Secondary School**

The participating secondary school is located in a large Ontario city of approximately 79,000 residents. Economically, this city relies heavily on the tourism industry. The school itself has a student body of approximately 870, of which most come from White, European descent. Recently, however, the school has seen a large influx of other cultural groups. Most of the students come from low- to middle-income families, although many of the students work long hours in tourism-related jobs and earn a great deal of their own money. Overall, there is a safe and positive atmosphere in the school as high expectations for student behaviour have been clearly established by the teachers and administrators. In this report, the participating school will be given the pseudonym Trinity Secondary School.

**Students**

The students invited to participate in this study were purposefully selected because they were enrolled in Logan’s Grade 11 biology class, and were thought likely to have a special interest in biology, as they had elected to pursue a demanding course preparing them for possible future university-level biological studies. The students and their parents provided
informed consent for participation in the study (Appendix B). In this thesis every student has been assigned a pseudonym.

Logan’s class was composed of 14 students, all of whom chose to participate in the study. On the whole, the students who enroll in academic-track science courses tend to be in the average- to high-achieving range and are often considering pursuing science study at the post-secondary level. This accurately describes the students who participated. For all of these students, this was the first time they had been enrolled in the Grade 11 biology course.

Demographically, these students were representative of the cultural and economic descriptors of the school population. The mean age of the participating students was 16 years, and the age range was 15 to 17 years. The student group consisted of five females and nine males.

Demographic and background information on students were gathered through interview and survey questions. The students in Logan’s Grade 11 biology class had all participated in at least one zoo visit prior to this study. Using simple descriptive statistical analyses (i.e., mean and range), it was determined that the total number of previous visits ranged from one to five visit(s) per student, the mean being three prior visits to a zoo per student. Most of the students in the class had visited the participating zoo prior to this study, either on a field trip or with their families, but three students had never visited this zoo before (Charlie, Roberto, and Ben). Other zoos that the students had visited prior to the study included: African Lion Safari, Safari NiagaraZooz, Montreal Biodome, Calgary Zoo, Buffalo Zoo, Disney’s Animal Kingdom (Walt Disney World, Florida) and Busch Gardens (Tampa Bay, Florida). Some of the students had also visited zoos outside of North America, including in Columbia (Roberto) and Thailand (Jacob). The students reflected on their prior zoo visits, but many reported that recall of learning and memorable experiences from these visits was limited. This was not surprising as most of the students had not been to a zoo in three or more years, and for some, early childhood was the last time they had visited a zoo.
Most of the students reported that they regularly recycled, and some provided other specific conservation-related actions that they had engaged in around the time of the study including: conserving water (Tessa); telling people to not litter and to respect nature and animals (Lily); and telling friends about the problems that our society needs to confront: global warming (Ian). Multiple students reported participating in various related experiences such as camping, hiking, boating, nature study, fishing, and hunting, as well as visiting museums, science centres, conservation areas, and provincial/national parks. None of the students reported belonging to or supporting an environmental group before, during, or immediately after the unit of study.

Zoo

The participating zoo is the Toronto Zoo, located in the Rouge Valley in Scarborough, Ontario, Canada. The zoo spans an area of 287 hectares (710 acres), with about 10 km (6 miles) of walking trails, making it one of the world’s largest. It hosts around 1.2 million visitors per year. The Toronto Zoo is home to approximately 5000 animals, representing over 500 different species, organized into seven geographic regions on the zoo grounds: IndoMalaya, Africa, the Americas, Eurasia, Australasia, Canadian Domain, and the Tundra Trek. The Toronto Zoo is owned by the City of Toronto and it employs approximately 242 permanent full-time staff, over 150 part-time or seasonal staff, and has over 200 volunteers (Toronto Zoo, 2015).

The Toronto Zoo was deliberately chosen as the zoo of focus for this study as it is a modern, professionally-managed zoo accredited for many years by the following associations: Canada's Accredited Zoos and Aquariums (CAZA); Association of Zoos and Aquariums (AZA); World Association of Zoos and Aquariums (WAZA); and American Association of Zoo Keepers (AAZK), (Toronto Zoo, 2015).

In addition, the Toronto Zoo was chosen for its commitment to conservation and education. Its vision is to “be a dynamic and exciting action centre that inspires people to love, respect and protect wildlife and wild spaces” (Toronto Zoo, 2015). This vision is put into action
through its many conservation-related initiatives, including: Adopt-A-Pond Wetland Conservation Programme; Arctic Ambassador Centre; Endangered Species Reserve Fund; Black-Footed Ferret Captive Breeding and Reintroduction Program; Vancouver Island Marmot Captive Breeding and Reintroduction Program; Bat Conservation International; and Turtle Island Conservation (Toronto Zoo, 2015). A commitment to conservation is further demonstrated through its numerous conservation-related research partners and affiliates, including: Ontario Ministry of the Environment; Ontario Ministry of Natural Resources; Canadian Wildlife Federation; Parks Canada; Environment Canada; Monterey Bay Aquarium Seafood Watch; and Polar Bears International (Toronto Zoo, 2015).

To meet its educational mission the Toronto Zoo offers a multitude of programs and services to teachers, school groups, camp groups, and the general visiting public. This includes: guided tours; workshops; outreach opportunities; zoo assignments, activities, lesson plans and resource booklets; parent and tot camps; child and youth summer camps; and family programs (Toronto Zoo, 2015).

Toronto Zoo personnel granted permission to name the Toronto Zoo in this study therefore deeming use of a pseudonym for the participating zoo unnecessary. Other zoos referenced in this report by their actual name are done so only when citing publicly available information (e.g., such as information found in pamphlets and on websites). A local zoo and zoo-aquarium discussed by the participants in this report were assigned the pseudonyms Rossville Zoo and AquaWorld respectively.

Zoo Staff

In this report I have sought a balance between protecting the anonymity of the participants and giving credit for their efforts, opinions, thoughts, and ideas. In some cases it would be easy for the reader to identify a zoo staff member based on their title or position within the zoo because they are specialized or because certain management-level positions are held by
only one person. In order to protect the true identity of the zoo staff participants in this study, I have opted to use general terms of identification such as zoo manager, supervisor, coordinator, curator, volunteer, or workshop leader, without additional identifiers such as a specific department or specialization within the zoo. Furthermore, all of the zoo staff members participating in this research have been assigned pseudonyms.

I made initial contact with a department manager at the Toronto Zoo through a cold call to the zoo. She expressed interest and agreed to further discuss my research proposal in person. During our first meeting, the department manager formally consented to participate in my research project and introduced me to a department coordinator. Both the department manager and coordinator were instrumental in the data collection phase of my study, as they participated in interviews, provided zoo documents, invited me to a one-day teacher “open house” at the zoo, took me on a tour of the zoo grounds, and responded to countless emails and phone calls related to this research.

Other zoo staff members who participated in this study were recruited through the use of a snowball sampling technique. Creswell (2008, p. 217) defines qualitative snowball sampling as “a form of purposeful sampling that typically proceeds after a study begins and occurs when the researcher asks participants to recommend other individuals to study.” In this way, I asked the department manager and coordinator to recommend paid zoo staff and non-paid zoo volunteers who might be interested in participating in an interview (who will be generally referred to as “zoo staff” in this report). Based on these recommendations, I was given the opportunity to interview the following zoo personnel, in addition to my initial department manager and coordinator contacts: a department supervisor, three department coordinators, a curator, two school workshop leaders, and two volunteers. In total, 11 zoo staff participated in this study. All of these personnel had held their current position for at least one year prior to the study, and their educational and professional backgrounds varied greatly. Several of the paid
staff members held a volunteer or seasonal position at the Toronto Zoo prior to their current and
more permanent position of employment. Additionally, many zoo staff members held diplomas
or degrees in a related field, such as Certificate in Museum Studies; Bachelor degrees in
Science, Environmental Studies, and/or Education; and three staff members held Master of
Science degrees as well. All of the zoo staff participants provided me with informed consent
prior to their participation in the study (Appendix B).

Curricular Context and Zoo Field Trip

This study can be best placed in the curricular context of secondary school science
education. Learning objectives for the students align with the Relating Science to Technology,
Society, and the Environment learning expectations in the Diversity of Living Things strand of
the Biology, Grade 11, University (SB13U) preparation course, as outlined in the Grades 11 and

To meet the curricular emphases outlined above, the participating teacher and I co-
constructed a unit of study that we entitled “Zoos and Conserving Biodiversity” (a detailed unit
overview and sample lesson plans can be found in Appendix C). This unit aligns well with
emphases and strategies associated with an STSE education framework (Pedretti & Nazir,
2011). The students were encouraged to think about science in its social, political, and cultural
contexts. The unit included the opportunity for the students to think about and examine multiple
issues related to conserving biodiversity and zoos. Further, this unit encouraged the students to
engage in decision-making and to take action. Modern day zoos emphasize that the aims of
conservation education are to develop positive conservation-related cognitive, attitude, and
action-oriented outcomes for learners (Athman & Monroe, 2001; AZA, 2004 and 2015; Ogden,
Gentile, & Revard, 2004). Likewise, our Zoos and Conserving Biodiversity unit of study aimed
to promote greater understanding, positive attitudes, and action related to conservation of
biodiversity among the students, through a combination of school-based learning and a zoo visit. Specifically, the objectives of our Zoos and Conserving Biodiversity unit were:

- to inform the students about current conservation issues associated with modern zoos, from a variety of perspectives;
- to promote positive conservation-related knowledge, attitudes, and actions among the students;
- to provide a chance for the students to think critically, examine their own values and beliefs, and formulate their own opinions; and
- to encourage the sharing of opinions, thoughts, and ideas through dialogue in small groups and in whole class discussions.

To create this unit of study Logan and I drew from a variety of existing resources. This included: the Toronto Zoo web site, Zoo Diaries videos (Appleby, Bernstein, Blye, Shekter, & Martyn, 2000 and 2001), and Project Wild activity guide (Canadian Wildlife Federation, 1997). In addition, we drew activities, ideas, and information for our unit from a variety of web sites, including those produced by: World Wildlife Fund (WWF); Heritage Canada’s Zoos and Aquariums Take Action!; Canada's Accredited Zoos and Aquariums (CAZA); and Association of Zoos and Aquariums (AZA).

Some specific examples of classroom activities from this unit of study include selected readings on topics like “Zoos and Captive Breeding”; Internet-based research mini-project focusing on missions and facts relating to zoos in North America; small group debates on ethical dilemmas relating to zoos and/or conservation; documentary videos focusing on zoo animals, conservation, and the behind-the-scenes work of zoo staff at a professionally-managed, modern zoo; and a teacher presentation called “Zoos and Misperceptions.” The culminating final project in this unit focused on zoos and/or conservation topics, and encouraged the students to engage in
some form of sociopolitical action. The students chose their specific topic, the format for their project, and the type of action they wanted to engage in.

Topics selected by the students for these projects included: zoo standards; bald eagle conservation; gorilla conservation; tiger conservation; and mammal conservation emphasizing black-footed ferret and Vancouver Island marmot conservation projects affiliated with the participating zoo (Toronto Zoo, n.d. a and n.d. b). For the action component of these projects the students elected to: raise awareness about their chosen issue through presentations to secondary school peers, younger (elementary) students, school bulletin board displays, and/or interviews on the school’s closed-circuit television presented live to every class in the school. One group created a website, and through a cold-call to a local newspaper participated in an interview about their project with a reporter, which was subsequently published by this newspaper. Another student group educated peers about their topic and sought support for a related petition trying to effect change.

The students’ one-day zoo visit to the Toronto Zoo was designed to complement the Zoos and Conserving Biodiversity unit of study. Three other science teachers and their classes joined us on the zoo trip, but did not participate in the study. In keeping with my role as “participant observer” (Marshall & Rossman, 1999), I joined Logan’s group at the zoo in order to observe and participate firsthand in the events of the day. Logan encouraged his students to learn more about the zoo by reading signage and talking to zoo staff, and also to take notes and pictures related to potential topics for the major projects. The students were not given any additional written assignments to complete. Activities at the zoo included: a presentation on zoos and conservation delivered by the zoo staff, unstructured exploration time to visit the zoo grounds in small groups of their choosing, and a volunteer-led guided tour. This tour included a behind-the-scenes visit to the white rhinoceros holding area and the zoo’s animal nutrition centre. The presentation and tour led by zoo staff focused on zoos and biodiversity conservation
(e.g., topics such as animal behaviour, enrichment, reproduction, reintroduction, conservation issues, and zoo animal nutritional science).

**Data Collection**

As is typical in qualitative case study research, the following data-gathering techniques were employed in this investigation: observations, interviews, meetings, personal communications, surveys, and the review of key documents. Appendix A provides an overview of the data collection timeline over the course of this research project. What follows is a detailed written description of these data collection techniques.

**Observations and Field Notes**

Marshall and Rossman (1999, p. 107) describe observation as the “systematic noting and recording of events, behaviours and artifacts (objects) in the social setting chosen for study.” Further, they suggest that “observation is a fundamental and highly important method in all qualitative inquiry,” as it “is used to discover complex interactions in natural social settings” (Marshall & Rossman, 1999, p. 107). In line with this perspective, observations on the behaviours and interactions of the students, teacher, and zoo personnel, as well as related events and artifacts, occurring in the secondary school classroom and at the zoo were made over the duration of the study.

Detailed observations were recorded in numbered field note entries in two small notebooks (see Appendix D for sample field note entries); embedded in these field notes are my personal thoughts, feelings, and analytic insights which emerged during the observational period. This aligns with techniques commonly practiced by qualitative researchers (Creswell, 2008; Marshall & Rossman, 1999).
Formal and Informal Interviews, Personal Communications, and Meetings

Patton (2002, p. 342) categorizes interviews into three types: the informal conversational interview; the general interview guide approach; and the standardized open-ended interview. The first two types were used in this study.

Informal conversational interviewing is the “spontaneous generation of questions in the natural flow of an interaction” and is expected to naturally occur during participant observation (Patton, 2002, p. 342). This type of informal interviewing was used with the students, teacher, and zoo personnel during observations in the classroom and at the zoo, as it offered the opportunity to “deepen communication with the person being interviewed and to make use of the immediate surroundings and situation to increase the concreteness and immediacy of the interview questions” (Patton, 2002, p. 343). In a similar vein, I was also able to gather insight into the case via meetings and personal communication (i.e., email and the telephone) with the zoo managers and teacher, during which time notes were taken and/or recordings of meetings were made. One lengthy meeting with the teacher (approximately 15 minutes) was conducted in the teacher’s office space, and was audio-recorded and later transcribed.

Patton (2002) identifies the general interview guide approach as one which “lists the questions or issues that are to be explored in the course of an interview” in varying amounts of detail “depending on the extent to which the interviewer is able to specify important issues in advance” (pp. 343-344). According to Patton, the advantage of this type of interview technique is that it allows the interviewer to remain focused through the use of a predetermined framework, while at the same time allowing for flexibility and spontaneity. A general interview guide format was used when I interviewed the teacher, students, and zoo personnel (refer to Appendix E for interview protocols). Another advantage of using the interview guide approach is that it allowed me to provide the interviewees with a paper copy of the interview protocol during the interview. Many of the interviewees read the questions on the paper copy of the guide...
while simultaneously listening to my verbal presentation of the questions. Many of the participants were appreciative and informed me that the dual presentation of the questions helped them to respond effectively.

The students’ interviews were each approximately 15 minutes in length and took place during class time in an adjoining science classroom or science teachers’ office, depending upon room availability. The teacher’s interviews were approximately 30 minutes in length and took place in the teacher’s office space. The zoo staff’s interviews were each approximately 20-30 minutes in length, and were conducted in a conference room in the zoo’s education building.

Prior to commencing the interviews and one teacher meeting, the participants were asked if they consented to having the interview audio-recorded for future transcribing and data analysis purposes. Two student participants chose not to be recorded and all the other participants consented to the recording. During the interviews and meeting I wrote notes on the participants’ responses; any additional questions which arose during our exchange; and my own personal thoughts, feelings, and emerging analytic insights, as suggested by Marshall and Rossman (1999).

In total, 11 zoo staff participated in an individual, semi-structured interview. The teacher and 11 of the students participated in two individual, semi-structured interviews (i.e., before and after the unit of study). Three male students (Jacob, Ian, and Liam) did not return their permission forms in a timely manner and therefore only participated in one interview (i.e., after the unit of study). For these three students, the demographic/background interview questions missed in the first interview protocol were added to the second interview protocol. Some focal questions from the first interview protocol were not answered by these three students, although wherever possible I asked these students to reflect on how their perspectives on zoos may have evolved over the course of the study during the second interview protocol. A possible limitation to this approach is that some of the views held by these students before the unit of study may
have been missed or recalled incorrectly. All three of these students had returned permission forms in time to participate in the survey before and after the unit of study, and before formal class observations and field notes had begun, thus allowing for some additional insight to be gained into their initial views through these other forms of data collection.

**Survey**

I used a modified version of an existing survey (Jordan & Seger, 2001) to gather background information on the participating teacher and students, as well as to help gain further insight into their views on zoos (Appendix F). I administered this survey to the students and the teacher before and after the Zoos and Conserving Biodiversity unit of study. Survey responses helped form the teacher and student profiles shared in the “Teacher” and “Students” sections of this chapter, and also contributed to findings shared in Chapters Four and Five.

The conservation education survey used in this study was originally developed by the Saint Louis Zoo staff (Jordan & Seger, 2001) and permission to utilize the survey was granted by Jim Jordan. This survey was also utilized by Kruse and Card (2004) to assess the effects of conservation education on campers attending a zoo conservation program. This survey was originally intended for parents of children participating in zoo camps, so I modified it slightly to make it more suitable for use by the teacher and students in my study. I also added two final questions (i.e., 31a and 31b) to the survey administered after the unit of study in order to gather information on any changes in the participants’ views on zoos over the course of the study.

**Review of Key Documents**

According to Marshall and Rossman (1999, p. 116), “the review of documents is an unobtrusive method, rich in portraying the values and beliefs of participants in the setting.” In following with this statement, I collected the following key documents for analysis: zoo mission statements; zoo educational program information; related school curriculum documents and resources; and researcher-, teacher-, and zoo-developed units and lesson plans. Student work
was also collected including electronic and hard copies of action projects and related documents (e.g., gorilla picture book; website information on mammal conservation, and a newspaper article based on this website; and a presentation and petition relating to zoo standards).

**Qualitative Data Analysis**

Qualitative data analysis was completed on an ongoing basis over the course of the research project. The constant comparative method (Lincoln & Guba, 1985; Maykut & Morehouse, 1994) was used to allow for overarching themes and implications to be “inductively derived from a rigorous and systematic analysis of the data” (Maykut & Morehouse, 1994, p. 126). Narrative vignettes were created in an attempt to capture the essence of the participants’ experiences and the meaningful events in the case (Polkinghorne, 1995). These methods of data analysis are described in detail in the following sections.

**Constant Comparative Method**

Maykut and Morehouse (1994) explain that, for qualitative researchers, the purpose behind the constant comparative method of analysis is to develop propositions or statements of fact which “stay close to participants’ feelings, thoughts and actions as they broadly relate to our focus of inquiry” (p. 126). This analytic method was well suited to the intent of my research study in that the desired outcome was to identify themes from the data which provide a greater understanding of the participants’ (students, teacher, and zoo staff) perspectives and experiences in the case.

The following sources greatly informed my use of the constant comparative method for data analysis: 1) Lincoln and Guba (1985), a refinement of the method originally put forth by Glaser and Strauss (1967); and 2) Maykut and Morehouse (1994), a practical step-by-step guide to using this method of analysis. This process of inductive coding and analysis of qualitative data has been similarly described by others in the literature (see for example, Berg, 1998;
Bogdan & Biklen, 2003; Creswell, 2008; LeCompte, 2000) and these sources were also useful in developing my analytic technique.

Generally speaking, there are two main processes involved in constant comparative data analysis: unitizing and categorizing (Lincoln & Guba, 1985). To unitize the data, one needs to break it down into “the smallest piece of information about something that can stand by itself” (Lincoln & Guba, 1985, p. 345). Categorizing the data involves bringing together units of data which relate to the same content, and to devise rules which describe the properties of a category, which can then be used to justify the placement of each unit within a certain category (Lincoln & Guba, 1985). The authors provide ten detailed steps for categorizing the data in this way. Maykut and Morehouse (1994) build upon this work and help to simplify the process for beginning qualitative researchers by describing the process of preparing and analyzing data.

The steps used to analyze data through the constant comparative method in this study can best be described as follows:

1. Each page of data was coded in the upper right-hand corner for tracking purposes, as described below. For electronic data (e.g., interview transcripts), this process was done electronically and for hard copy data (e.g., field notes), photocopies were made prior to coding.
   a. Type of data (IT=Interview transcript, IN=Interview notes, MT=Meeting transcript, MN=Meeting notes, F=Field notes, S=Survey, D=Other supporting documents);
   b. Source of data (T = Teacher, R = Researcher, Z# = Zoo personnel participants with participant numbers from 1-11, S# = Student participants with participant numbers from 1-14, SS = observation at the secondary school, TZ = observation at the Toronto Zoo); and
   c. Page number of the data set and interview number where applicable.
An example of how this coding process comes together is as follows:

“IT#1/T-2” represents the second page (2) of transcript from the first interview (IT#1) with the teacher (T).

2. The data were then unitized into meaningful chunks. To accomplish this task, I reviewed each data source and identified meaningful chunks of data; and then inserted a word or phrase which described the essence of the unit of data (see Table G1 in Appendix G for sample). This process was completed electronically for electronic data and manually for hard copy data.

3. Units of data were then placed into tentative coding categories, which were recorded in chart form using a word processing program (see Table G2 in Appendix G). Lincoln and Guba’s “look alike or feel alike” criteria helped guide the placement of units of data under one of the tentative coding categories. As I reviewed units of data, new categories were created when a unit of data did not fit under any of the existing coding categories, and sub-categories were created when groups of data could be divided within a main category. This analytic method continued until all of the data units were assigned to one of the categories.

4. These categories were then reviewed and refined multiple times using a similar process as described in Step 3, to determine final coding categories which addressed the two main research questions (see Table G3 in Appendix G).

In sum, the constant comparative method of data analysis was used to analyze qualitative data in this study. This yielded units of data which were then grouped thematically into tentative coding categories. These categories were further refined, and overarching themes were written as propositional statements of understanding to address the research questions.
Narrative Analysis

To assist in responding to the research questions, narrative analysis was also used in this study. The advantage of narrative, according to Polkinghorne (1995, p. 8), is that “stories express a kind of knowledge that uniquely describes human experience in which actions and happenings contribute positively and negatively to attaining goals and fulfilling purpose.” In addition, “storied memories retain the complexity of the situation in which an action was undertaken and the emotional and motivational meaning connected to it” (Polkinghorne, 1995, p. 11). This study employed narrative inquiry for these unique qualities, in the hopes of producing vignettes which serve as rich resources for describing the perspectives and experiences of the participants in this case.

Polkinghorne (1995) uses the term “narrative to refer specifically to texts that are thematically organized by plots,” (p. 5) since as he points out, the term narrative has been used in many ways in qualitative research. For the purpose of this study, narrative inquiry will be referred to in the same manner (i.e., inquiry through the use of story). Further, Polkinghorne identifies two types of narrative inquiry: analysis of narrative and narrative analysis, which correspond to Bruner’s (1985) two types of cognition (paradigmatic and narrative).

In the first type, analysis of narratives, researchers collect stories as data and analyze them with paradigmatic processes. The paradigmatic analysis results in descriptions of themes that hold across the stories or in taxonomies of types of stories, characters, or setting. In the second type, narrative analysis, researchers collect descriptions of events and happenings and synthesize or configure them by means of a plot into a story or stories . . . Thus, analysis of narrative moves from stories to common elements, and narrative analysis moves from elements to stories. (Polkinghorne, 1995, p. 12)

For this study, narrative analysis was employed as a means of depicting the students, teacher, and zoo staff viewpoints and experiences through story.

Seven guidelines for developing narratives are suggested by Polkinghorne (1995) based on the earlier work of Dollard (1935). I have listed these criteria below as they were used as a
guideline in the formation of vignettes for this study. According to Polkinghorne the researcher should:

1. attend to the contextual features that give specific meaning to events;
2. attend to the embodied nature of the protagonist;
3. be mindful of the importance of significant other people in affecting the actions and goals of the protagonist;
4. concentrate on the choices and actions of this central person;
5. consider the historical continuity of the characters;
6. generate a story with a bounded temporal period (that is, a beginning, middle, and end); and
7. judge the adequacy of the narrative at making the researched occurrence plausible and understandable.

(p. 16-18)

In composing the narrative, Polkinghorne (1995) describes how the “final story must fit the data while at the same time bringing an order and meaningfulness that is not apparent in the data themselves” (p. 16). In addition, “the storied finding of a narrative analytic inquiry is not a third-person ‘objective’ representation or mirrored reflection of a protagonist’s or subject’s life as it ‘actually’ occurred; rather, the finding is the outcome of a series of constructions,” including the researchers’ own contributions (Polkinghorne, 1995, p. 19). Therefore, in this study, narrative vignettes were used to capture the essence of the viewpoints and experiences of the researcher and participants, to highlight significant thematic findings and events, and to provide rich context for the case.

The specific steps used to analyze data in this study through the narrative analysis method are as follows:

1. Significant experiences and events in the case were identified through a review of the data (e.g., field notes, interview transcripts, survey responses, and key documents);
2. A plot outline for each vignette was framed around significant experiences, events, and thematic findings (i.e., themes previously identified through the constant comparative method);
3. Details for each vignette were filled in with references to the data to create complete stories; and

4. The vignettes were reviewed and refined multiple times with consideration of Polkinghorne’s (1995) seven guidelines for writing a narrative.

In sum, in following with Polkinghorne who stated that “the purpose of narrative analysis is to produce stories as an outcome of research” (p. 15), six vignettes were created to bring together elements of the data into a coherent account. These vignettes aim to provide the reader with a window into the case.

**Establishing Trustworthiness**

Yin (1994) recommends that researchers follow three principles of data collection to maximize the benefits from case study research and to help establish trustworthiness. These principles are: use multiple sources of evidence, create a case study database, and maintain a chain of evidence. I will now explain how I incorporated each of these principles into my research.

**Principle 1: Multiple Sources of Evidence**

First, Yin (1994) proposes that collecting different sources of evidence is a strength of, but also a need in, case study research. It is a strength because it allows the researcher “to address a broader range of historical, attitudinal, and behavioural issues” (p. 92). On the other hand, it is necessary to make a more convincing and accurate conclusion through triangulation (or through corroboration of the same phenomenon across multiple sources). Yin further advises that triangulation addresses the potential problem of construct validity because “multiple sources of evidence essentially provide multiple measures of the same phenomenon” (p. 92).

In this study, I collected data through multiple sources (i.e., interviews, meetings, personal communications, observations and field notes, surveys, and supporting documents).
This allowed me to triangulate the findings through the consensus of ideas across various types of data and across the participants.

**Principle 2: Case Study Database**

Yin (1994) proposes that “every case study should strive to develop a formal, presentable database, so that, in principle, other investigators can review the evidence directly and not be limited to the written reports,” (p. 95) and in this manner, reliability of the case study increases. In following Yin’s suggestions for creating a case study database, I have outlined in detail how my data was organized and categorized in the “Qualitative Data Analysis” section above. Recall that all data sheets contain a descriptor (including date and location) and were stored and referred to by such means.

**Principle 3: Chain of Evidence**

Yin (1994) advises that in order to increase reliability the researcher should maintain a chain of evidence. If this is done effectively, an external observer should be able “to follow the derivation of any evidence from initial research questions to ultimate case study conclusions” (p. 98). In addition, Yin proposes that construct validity, and the overall quality of a case, is strengthened when the process demonstrates that the same evidence that is collected is presented in the case study.

As described previously, an audit trail of the qualitative analysis process was created through the use of electronic charts (see tables in Appendix G). To further achieve a trustworthy chain of evidence, the participants were involved throughout the research process. Specifically, the teacher, students, and zoo personnel were asked to provide input during the collection of data and “member checks” were sought on the initial reporting of analyses. This gave the participants the opportunity to further share their ideas and to verify that the findings truly represented their understanding of the process. This practice aligns with other qualitative researchers who place importance on conducting member checks in establishing trustworthiness.
in a research inquiry (for example, Creswell, 2008; Lincoln & Guba, 1985; Maykut & Morehouse, 1994).

**Limitations and Scope of Study**

This study was limited to the selection of student participants from one class at one secondary school, one teacher, and zoo staff from one zoo. As with most case study research, this study does not attempt to make widespread generalizations, rather it strives for an in-depth study of a singular case. Thus, the reader should be cautious in broadly applying the results obtained from this study to other settings. However, it is hoped that the reader will find that aspects of this study are of relevance to their own setting. Stake (2000) calls this “naturalistic generalization” and believes it is achieved through experience as one develops “a full and thorough knowledge of the particular,” which then allows one to recognize it in “new and foreign contexts” (p. 22). Polkinghorne (1995) reveals a similar viewpoint on this issue with regards to narrative inquiry when he writes, “the cumulative effect of narrative reasoning is a collection of individual cases in which thought moves from case to case instead of from case to generalization. This collection of storied experiences provides a basis for understanding new action episodes by means of analogy” (p. 11).

Member checks of initial findings were limited to the zoo staff and teacher as the students had moved on and were not accessible to provide their input. However, it should be noted that during the data collection phase all of the participants were encouraged to express opinions and to ask questions about the research project and unit of study, and were given multiple opportunities to share opinions (e.g., informal exchanges, interviews, survey responses, class activities, and assignments). Further clarification was sought on ideas or opinions shared by the participants during informal exchanges and interviews as I deemed necessary during the data collection phase.
Despite these limitations, it is hoped that this research leads to an improvement in the understanding and/or implementation of school- and zoo-based education efforts for readers who may be able to apply some aspect of this study to his/her own context.

**Ethical Considerations**

The study began after official approval had been granted from the Curriculum, Teaching, and Learning Department at The Ontario Institute for Studies in Education (OISE) and the University of Toronto’s Education Research Ethics Board. Permission to conduct the research was also sought from the Toronto Zoo and each individual participant from the zoo. Further, the school board of the participating school, the principal, teacher, students, and parents of students all provided consent prior to the commencement of this study. Since the student participants in this study were minors, both student and parental consent was sought. I was diligent in treating all of the participants in this study ethically and with respect. All personal data has been kept strictly confidential and all information was coded so that the participants’ names have not been associated with researcher observational notes, interview responses, and/or school work. The audio and written data is stored in a secure location and will be destroyed after completion of the thesis.

**Chapter Summary**

In summary, I have sought to describe the research sites (i.e., school and zoo), the participating students, teacher, and zoo personnel, as well as curriculum resources. These people and resources were purposefully selected as they were naturally connected to various aspects of the phenomena under study.

Further, in this chapter, I have sought to provide justification for the use of case study and narrative, within an interpretive and naturalistic framework. I believe that this justification was achieved through demonstration of how the intent of the study aligns with the aims of the modes of inquiry. Although limitations to this research exist, this is the case with any research
and I have openly discussed them for the purpose of allowing the reader to draw his/her own
conclusions on the quality of the inquiry.

In the next two chapters (Four and Five) I describe the major findings of this research inquiry. Each of these chapters focuses on one of the two major research questions.
CHAPTER FOUR:

PARTICIPANT PERSPECTIVES ON ZOOS

In Chapter Four the views on zoos held by the students, teacher, and zoo staff are explored within the context of a Grade 11 biology unit focusing on zoos and biodiversity conservation. This chapter thus addresses the first research question of this study.

This chapter begins with three vignettes focusing on participants’ views on zoos. The vignettes are followed by findings described in three subsections: “Student and Teacher Perspectives,” “Evolving Student Perspectives,” and “Zoo Staff Perspectives.”

Vignettes about Participant Perspectives on Zoos

Using the narrative analysis process described by Polkinghorne (1995), three vignettes were constructed to highlight important themes emerging from the data. Vignette 1 focuses on a classroom-based lesson in which the teacher introduces the upcoming trip to the Toronto Zoo to his class. The teacher and students then discuss an Internet-based research assignment focusing on zoos and aquariums located in North America. The views on zoos held by the teacher and students are clearly embedded in these exchanges.

Vignette 2 is set at the Toronto Zoo during a behind-the-scenes visit led by a zoo volunteer, including a visit to the white rhinoceros exhibit. The perspectives on zoos held by the teacher, zoo staff, and students are revealed through the interactions among the participants in this setting.

Vignette 3 is set in the classroom following the zoo visit, and focuses on a group of three students working on an action project aimed at promoting better regulations for zoos in Ontario. The students’ views on perceived substandard or “roadside” zoos are revealed in this vignette. In each of these scenarios my role was that of a participant observer, recording observations in
field notes as well as participating in the lessons and activities with the teacher, zoo staff, and students.

**Vignette 1: Food for Thought**

As the bell rang to indicate the start of class, Logan Bennett entered the classroom wearing a bold necktie patterned in colourful fish. After taking attendance and engaging in a few minutes of good-humoured exchange with students, Logan began with a recap of the previous lesson, “recall that last time we discussed some alternative ways for thinking about zoos, as well as variable zoo standards of practice. I shared my personal view that not all zoos are good.”

Most students acknowledged that they recalled the previous lesson. Logan had shared his view that small zoos with inadequate space for large captive animals were cruel, and that he believed such zoos were poorly-regulated in Ontario. He had also shared his view that large, professionally managed zoos had a necessary and important role to play in today’s world.

“Which brings me to my next question, what do you know about professionally-managed zoos and what they do? What are their main mission objectives?” Logan asked.

With his help, Logan’s students identified the four main objectives of modern day zoos as being entertainment, conservation, education, and research.

“Now I am curious, do you think zoos are doing a good job of achieving these missions?” Logan probed.

“I think zoos do a pretty good job. It’s good that people can go to zoos because then they learn more too,” stated Lily.

When no one else responded, Logan continued with, “Okay, we’ll come back to this question later. For now let’s take a closer look at the Toronto Zoo and our upcoming field trip.” Logan believed it was important to orient his students to an informal learning site before participating in a field trip, and over the years had developed a PowerPoint presentation on the Toronto Zoo for this purpose.

The presentation began with a slide of the Toronto Zoo’s website homepage which Logan believed was an excellent resource for accessing information about various wild animals and the zoo. The next few slides helped Logan inform the students about his plans and expectations for their field trip to the zoo.

“We don’t go on a field trip just for fun; there should be an educational component to it as well. Some schools go to the zoo in Grade 10 but I like going in Grade 11 because you often get students who are more interested in biology and you get more interesting assignments. As we discussed previously, try to choose your topic for the major project before we go, because ideally you want to go to the zoo and know what you want to study. On the other hand, if you are inspired by something when visiting the zoo and want to change your topic, that is okay too, just come talk to me,” stated Logan.

Logan’s view was that zoos held great potential to educate people about wildlife, conservation, and science, and in this way they provide visitors with “food for thought” on wildlife biodiversity and related conservation issues. He saw zoos as being uniquely positioned to connect people firsthand with wildlife in a way that they might not otherwise experience. Logan’s educational objectives for this zoo field trip included
having the students gather information and pictures for their major project, in the hope that the zoo visit might spark an interest in a certain animal or a related conservation initiative among his students. Another learning objective he held for his students was to become more informed about the zoo. To meet these objectives, Logan encouraged the students to read zoo exhibit signs and speak with the zoo staff.

Logan shared pictures of animals and exhibit signs from the Toronto Zoo over the next few slides. “In this slide you see a picture of a Serval Cat in its enclosure at the Toronto Zoo. At first glance, one asks, how can we keep it in a cage? But, in the next slide you see the exhibit sign which tells you that this animal was born in a private breeding facility in British Columbia and then sold to an individual living in Ontario. This individual quickly realized that the animal was too hard to handle and dropped it off to the Ontario Society for the Prevention of Cruelty to Animals (OSPCA). Eventually the Serval Cat came to live at the Toronto Zoo. This is one example of how reading the signs at the zoo can inform you about individual animals or species of animals at the zoo, or about the zoo itself. The zoo provides us with lots of information but we see a cute, cuddly animal and we run past the signs. Try to take time on this trip to read the signs! Or try to take pictures of the signs and read them later at home,” explained Logan.

After sharing a few more slides including the Toronto Zoo’s mission statement and specific examples of efforts made by the Toronto Zoo towards achieving education, conservation, and research objectives, Logan’s presentation drew to a close and he moved on to the next part of the lesson.

“You have had a chance to do a mini-research assignment on the Internet about a zoo or aquarium in North America. Nowadays, if zoos and aquariums want to educate people they need good websites. Let’s hear what you found out about these zoos and aquariums, what they are doing for conservation, and how you feel about it,” stated Logan.

Two students named Liam and Bobby were the first to share their findings. They had chosen to research the San Francisco Zoo and read brief, factual responses previously recorded onto the assignment sheet.

Logan asked “Would you would want to visit this zoo?”

Liam and Bobby simultaneously replied “yes.” Liam then added “because it has a lot of animals I would like to see.”

The next group had chosen to research the San Diego Zoo. Once again brief, factual details about the zoo were shared with the rest of the class.

Logan then asked these students, “Overall, how would you rank the zoo?”

They responded, “it was pretty good” and “almost double the size of the Toronto Zoo.”

The next group, Roberto, Jacob, and Ben, had chosen to research SeaWorld, Busch Gardens. Speaking for the group, Ben introduced their topic and then stated, “We found that this aquarium and their website are more about entertainment than conservation.”

“Interesting point,” Logan responded. Seeking further comment from the group, he then asked, “And do you think entertainment is enough justification for zoos and aquariums?”
Emphatically, Roberto and Ben replied “No!”

Logan added, “I think of AquaWorld2 in the same sort of way. When I go to AquaWorld the feeling of entertainment is everywhere. I see a greater emphasis on entertainment at AquaWorld than at the Toronto Zoo. Circuses are the same for me. They have a high entertainment factor and I’m not a big fan of circuses. I don’t think it is right to domesticate those animals. The way I see it is there is a continuum between the circus and the wild, and zoos are somewhere in the middle. Further, the Toronto Zoo is also not the same as a petting zoo; the latter has more domestic animals.”

“I agree, I see a difference between amusement parks and zoos,” interjected Ian.

“Which makes you wonder, where does the balance lie? If you were designing a zoo exhibit, would the purpose be to entertain the visitors or do you prioritize the comfort and welfare of the animals? Think about it, large exhibits are better for the animals, but then the problem is that zoo visitors can’t see them as well,” explained Logan.

“So would it be better to go on a safari?” asked Jacob.

Logan responded with, “Probably,” and then added, “But think about the cost to travel abroad and go on a safari. And think about whether the money you spent would still benefit the animals, like it does at the zoo. My personal fear is that because most of us will not travel to a wild space like an African savannah, we won’t get the awe of seeing wild animals without zoos. Most students don’t consider science videos to be exciting and don’t always connect to nature when watching them. The zoo helps you connect to nature firsthand. Zoos are artificial, but so are keeping pets. That’s why I ask you, where do we draw the line? What should we do?”

The students were listening attentively, but no one offered a response.

After pausing briefly, Logan added, “Now think about this, does the zoo meet conservation goals? And does this justify its existence? One of the things I want you to find out on our trip is what conservation work the Toronto Zoo is doing outside of the zoo.”

“Okay, let’s hear what the remaining groups have found on their chosen zoos and aquariums,” Logan continued.

After the remaining student groups reported on their findings, Logan concluded the class with a brief summary, “So, you can see that zoos are not all the same. Some are smaller, some larger, some more research-based, some more entertainment-based. How many of you have been to Rossville Zoo3? You many have noticed that some animals are in small cages in the sun. I am sure that the owner does care about them, but the entertainment factor is high and the animals are on display so people can see them easily. For some small zoos such as this one, the entertainment factor is a priority because they have to bring in people for the revenue needed to stay in business. What do you think about the splash pad at the Toronto Zoo? Just think for a moment about the economics of zoos. Do you think zoos could do more if they had more money? And here is another question, if I asked you for the thirty dollars that you would normally pay to go to the zoo and said I’m donating it to an African savannah conservation project instead, what would you say?”

“I would say do it!” declared Jacob.

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2 AquaWorld is a pseudonym.
3 Rossville Zoo is a pseudonym.
Vignette 1: Summary

In the preceding story ‘Food for Thought’ Logan began the lesson by sharing a presentation he had prepared on the Toronto Zoo, believing that it was important to orient his students to the informal learning site and share learning expectations prior to engaging in a field trip. He made it clear that he wanted the students to enjoy the field trip, but at the same time he expected it to be an educational experience. Logan suggested that while visiting the zoo the students should learn about wildlife and the zoo by reading signage and speaking with the zoo staff. He then encouraged them to gather information about the zoo’s conservation efforts. He also suggested that they record information and take pictures for their action project while on zoo grounds. In the second half of the lesson, students shared and discussed their Internet research findings on North American zoos and aquariums. Various perspectives held by the teacher and students were revealed through these exchanges, including the teacher’s perspective that zoos can provide visitors with “food for thought” on biodiversity and related conservation issues.

Vignette 2: Behind the Scenes

Logan and his class, along with three other teachers and their classes from Trinity Secondary School had been on site at the Toronto Zoo for approximately three hours. Earlier in the day they had attended a presentation on zoos and conservation delivered by the zoo staff, and then Logan and the other teachers had given students permission to break off into small groups to explore the zoo and eat lunch. It was now 1:00 pm and as instructed the students had joined Logan and the other teachers at the designated meeting place outside the zoos’ education building. The teachers and their classes had been assigned a zoo volunteer to lead them on a tour of the zoo, including a behind-the-scenes visit to the Animal Nutrition Centre and an indoor enclosure for one animal species. Logan’s class would be visiting the white rhinos in the African Savannah area of the zoo.

The volunteer guide assigned to Logan’s class walked over to the group and introduced herself, “Hello and welcome! I’m Kim and I will be your guide this afternoon. I have been a volunteer here at the Toronto Zoo for just over 30 years. I understand you have had some time to explore the zoo grounds on your own this morning and now I look forward to showing you some of our animals and sharing some of the behind the scenes work done here at the zoo. Follow me!”
Many students had been eagerly awaiting this tour and listened attentively as the group made their way across the zoo grounds with Kim. For a few students it was evident that fatigue was setting in as they struggled to keep up with our enthusiastic guide. These students lagged at the back of the group and paid little attention to what Kim was saying. Kim led us into the African Rainforest pavilion and stopped in front of the western lowland gorilla exhibit. The gorillas were situated outdoors as it was a sunny autumn day, with exception of one large male who was eating alfalfa in the indoor section of the exhibit. To the great dismay of many students, this gorilla began exhibiting what they called “gross” eating habits (i.e., chewing, regurgitating, and then re-eating the alfalfa).

“It looks like that gorilla is depressed, he’s just sitting there all alone. And yuck! He is eating food he just spit up!” Bobby exclaimed.

“No, he’s just doing what gorillas do. The problem with male gorillas is that once they become adults they can’t live with other males. We have to separate him for his own safety and for the safety of the other gorillas. There has even been some talk about starting a bachelor group for the male gorillas. The zoo has enrichment programs in place for the gorillas as well as for many other zoo animals here at the zoo” responded Kim.

As we stood beside the gorilla exhibit, Kim continued to share information about lowland gorillas and their enrichment programs at the zoo. She spoke about threats to survival faced by gorillas in the wild, placing emphasis on the harm done by human activity such as civil wars, mining, and poaching. She also commented on the Toronto Zoo’s involvement in recycling cell phones to help reduce mining for Coltan in gorilla habitats. Kim’s view was that zoos have the potential to help visitors gain an understanding and appreciation for nature and wild animals. In her opinion, a zoo visit could help foster a sense that everything on earth is interconnected. Her commentary at the gorilla exhibit exemplified these views.

“Now let’s make our way to the white rhino exhibit,” Kim stated, leading the way toward the barn which housed the zoo’s white rhinos.

Knowing that this was an area normally restricted to the zoo staff and public tours were uncommon, Logan was pleased that the students were given this opportunity. He believed that a greater appreciation and understanding of rhinos might come from this close encounter. He was also pleased that students were given the opportunity to meet a zoo keeper and ask questions about the rhinos and the zoo.

Strong smells typical of a farm filled the air as we entered the rhino barn, generating instant negative remarks from students.

“Oh nasty, what a stench!” shouted Charlie.

Kim paused to share some information about the threatened status of the white rhino in Africa before leading the group around the corner to where the rhinos were resting in separate enclosures. Kim’s commentary included topics such as “the illegal hunting of rhinos by poachers as a significant threat to populations in the wild” and that “to reduce poaching threats horns had been cut off living rhinos in the wild.” After speaking for a couple minutes, Kim led us around the corner to where we could see the rhinos and a zoo keeper, and exclaimed “And here are two of our white rhinos!”

The zoo keeper shared some basic facts about white rhinos (e.g., the horn is made of keratin, same as human hair and fingernails), the age of the zoo’s rhinos, how the zoo acquired these animals, as well as some details about his job as zoo keeper. Some
students listened attentively, while others showed little interest. Suddenly the larger of the two rhinos began to aggressively pound the door to the outside enclosure and urinated heavily a few times. This behaviour captured everyone’s attention. Several students found the behaviour amusing and recorded the rhino’s actions on their cell phones and cameras, making comments to one another about what had transpired and replaying the video clip. Logan quickly discouraged this behaviour. After finishing his talk, the zoo keeper invited us to ask questions and to take turns touching the side of the smaller rhino through the bars of its enclosure. Logan and I, along with most of the students chose to do so, but a few students did not. This concluded our behind-the-scenes tour with the white rhinos and Kim led us out of the holding area toward another exhibit.

I would find out later in our interview sessions that the behind-the-scenes tour of the white rhino exhibit was experienced very differently among the students. For example, Jillian revealed that by meeting the zoo keeper, she learned that zoo personnel take really good care of the animals, something that she did not know before the tour. Lily found the experience to be long and drawn out, and rather uninteresting other than the unexpected behaviour of the rhino which she found amusing. Jacob was appreciative of the educational value of the tour, but thought that the rhino looked bored and was acting out aggressively because of it. He also revealed that the behind-the-scenes tour of the rhinos and visit with the zoo staff did not change his against-zoos stance.

Vignette 2: Summary

The story entitled “Behind the Scenes” is a window into the zoo field trip as experienced by the participants. While at the zoo, Logan and his class participated in a variety of activities including a guided tour led by Kim. During the tour she shared information on certain zoo animals and highlighted challenges faced by these animals in the wild. Her views in support of zoos were shared through these exchanges. During a behind-the-scenes tour of the white rhinoceros exhibit, students met a zoo keeper and had an up-close encounter with two rhinos. Students’ reflections on this experience varied greatly.

Vignette 3: Petitioning for Better Zoos

Logan had asked students to come to class prepared to do an informal presentation on the progress made on their action projects. Logan and I had collaborated on the development of this major project which aimed to have students: (1) become more informed about a conservation-related issue or initiative associated with a modern zoo; and (2) engage in positive conservation-related action. Logan had outlined detailed expectations for the project in a previous class and had provided the students with some class time to work on it.

“Okay class, let’s get started. Which group would like to go first?” asked Logan.
Jackie, Jillian, and Tessa raised their hands to indicate that they were ready to share their project with the class. The girls had prepared a PowerPoint presentation entitled “Zoo Conservation,” which touched on some of the topics covered in previous lessons, such as conservation initiatives and partnerships of modern day zoos, as well as some alternative ways of thinking about zoos.

Jillian shared her personal views on the topic by saying, “Before this unit I wasn’t really sure what zoos were doing and what they were all about. As far as conservation efforts, how they take care of the animals, and the science behind it—I was like a blank page before all of this! So everything we learned in this unit affected how I felt about zoos. And it made me feel better to know the science behind what they were doing. It was more of a comforting thing because before this unit I wasn’t really sure about what zoos could do about conservation. This definitely opened my eyes!” Tessa and Jackie both nodded in agreement.

The girls continued with their presentation and focus soon turned on to the topic of zoo standards. The girls shared a definition of roadside zoos and some documented examples of when animals and humans had been harmed in these facilities. It appeared that Jillian felt passionately about this topic as she emphatically stated, “If you are going to keep animals in captivity, do it right or don’t keep them at all!” She then shared examples of regulations for zoos in Alberta, Canada and in Great Britain, and stated that standards for zoos in Ontario were sadly lacking in comparison. “Ontario is the worst in Canada. We have few regulations in place, other than for abuse of animals. I advocate for increasing standards of care for animals, which will also benefit visitors by keeping them safe.”

Over the next several slides the girls described organizations like American Zoological Association (AZA) and World Society for the Prevention of Animals (WSPA) and their limited roles in regulating zoos.

“And I recommend going to the zoo’s website before visiting. If they belong to or have been successfully evaluated by an organization like AZA or WSPA then it is pretty prestigious, so they advertise it, and if they don’t have a website that tells you something too. If zoos fail there’s nothing we can do!” Jillian stated.

The focus of the girls’ presentation then changed unexpectedly and they began to suggest ways that people could respect nature and help care for the environment at home, school, or work. After the last slide, Tessa thanked the class for listening to their presentation and asked if there were any questions. No students responded. Logan praised the group for their hard work and then offered some next steps. First, he proposed that they narrow down the focus of their presentation to one area of emphasis. Secondly, he challenged them to find a way to take their project “to the next level” by including an action component. He gave some examples, such as carrying out one of the actions to benefit the environment suggested in their presentation, or writing a letter to the government about their concern over the regulation of zoos in Ontario.

The next day Jackie, Jillian, and Tessa excitedly came into class with an update on their project. “Mr. Bennett! Mrs. Winslow! Look what we found on the Internet last night. It’s a petition that ties in perfectly to our major project!” stated Tess.

Tess further explained that petition signatures were being collected by members of the Toronto chapter of the WSPA to show public support for a proposed bill called “The Regulation of Zoos Act.” If passed, this bill would mandate increased government regulation of zoos for the protection of animals and communities in Ontario. The girls
had decided the previous evening that they would narrow their focus to the topic of zoo standards and regulations and that they wanted to raise awareness about, and gather signatures for, this proposed bill.

Over the next couple of weeks Logan and I met intermittently with each of the student groups to support them as they worked on their action projects. Due to the need to cover a demanding curriculum during class time, students were also expected to work on their action projects in their own time. During this time Jackie, Tessa, and Jillian worked to revise their PowerPoint presentation and made arrangements to share it with two other science classes in their school.

On the day of the girls’ first presentation to a Grade 12 General Science class, Logan had a prior commitment and was unable to attend. Jackie, Jillian, and Tessa arrived at the Grade 12 class and greeted the teacher and me before setting up for their presentation. The girls appeared to be both nervous and excited. After the bell rang, the host teacher introduced the three girls to her class and asked them to begin.

Jillian spoke first, “Our presentation is on the topic of zoo standards. We are going to talk to you about our take on this issue in Ontario and afterwards, if anyone is interested in doing so, we have a petition for you to sign.”

The trio took turns presenting information which included an overview on modern zoo mission objectives (education, research, conservation and entertainment) and current regulations for zoos in Ontario. The girls described roadside zoos and then shared their views on them.

To exemplify the conditions of a poorly managed roadside zoo the girls shared a video clip that they had found on the Internet which showed baboons pacing back and forth in a small barren cage. Several Grade 12 students in the audience laughed loudly in response to the video. Jillian was visibly displeased by this reaction and firmly stated, “You laugh, but think about it, it’s not funny! For these baboons there is a small cage and boredom, no enrichment programs at all. And there’s nothing you can do about it!” Jillian’s concern for zoo animal welfare was exemplified in this moment.

As the next slide entitled “Why are Zoo Standards Important?” was put on the screen Jillian continued with, “The future of many species today depends on the help of zoos, and in my opinion it is their responsibility to care for these animals properly! But zoo standards must be enforced to ensure the most basic care for all zoo animals.”

After a few more slides the girls introduced the proposed “Regulation of Zoos Act” and the petition. Aside from the unexpected outburst of laughter earlier on, the presentation was well received and the Grade 12 student audience was attentive and respectful toward the girls. Before leaving the classroom Jackie, Jillian, and Tessa answered questions, mostly related to the video clip and other websites the girls had recommended during their presentation. Students from the audience were voluntarily signing the petition, and the trio were visibly pleased by the overall response from their peers.

Vignette 3: Summary

The story of “Petitioning for Better Zoos” took place at Logan’s school and focused primarily on one group of students working on their major project on the topic of zoo standards.
Jillian revealed that before working on this project she was “a blank page” on zoos, and that she was open to learning more about them. The student group featured in this story had found a petition on the Internet advocating for stronger regulations of zoos in Ontario, and decided to raise awareness about it among their peers. They created a PowerPoint presentation on this topic which was shared with their own class and two other classes in their school. During one of these presentations, students in the audience reacted with laughter to a video clip of distressed baboons at a roadside zoo, evoking a powerful response from Jillian. In this vignette, students shared concerns about roadside zoos and governmental regulation of zoos in Ontario.

**Findings: Exploring Participant Perspectives on Zoos**

The preceding vignettes were constructed to help depict the perspectives on zoos held by the participants through their exchanges and experiences in the classroom and at the zoo. The views held by the teacher and the majority of students were found to be similar in nature (although the teacher’s views were more sophisticated), so I therefore decided to present the findings related to their views in one section of this report, entitled “Student and Teacher Perspectives.”

Further analysis revealed that changes in student perspectives occurred over the course of this study. These changes are described in the section entitled “Evolving Student Perspectives.” This same shift was not observed in the perspectives held by the teacher or zoo staff perspectives, as their views appeared to be firmly established prior to the study. Thus, this section relates solely to shifts observed in the students’ perspectives.

A third subsection entitled “Zoo Staff Perspectives” explores the predominately for-zoos stance held by the zoo staff. Although these views did hold some similarity to those expressed by the teacher and the students, differences in concerns about zoos (or lack thereof) were significant enough to warrant a separate subsection for the zoo staff’s perspectives.
Student and Teacher Perspectives

Greaves, Stanisstreet, Boyes, and Williams (1993, p. 60) define the “mixed” views on zoos held by the participants in their study in two ways: (1) the participant concurrently holds views for and against zoos; or (2) the participant agrees with zoos but only under certain qualifications or with certain limitations (i.e., a “qualified agreement” of zoos). This two-part definition for the term “mixed” view on zoos was utilized in the current study. In other words, the participants in this study who concurrently held views in support of and against zoos, or views in support of zoos that were limited by certain conditions or stipulations, were considered to hold mixed views on zoos. Using this definition, a finding that emerged from analysis of the data was that the majority of the students and the teacher held mixed views on zoos.

For example, in Vignette 3 Jillian’s mixed views on zoos were revealed during her class presentation:

The future of many species today depends on the help of zoos, and in my opinion it is their responsibility to care for these animals properly! But zoo standards must be enforced to ensure the most basic care for all zoo animals. (Jillian, Field Note #18)

This example illustrates a view in support of zoos (i.e., they are necessary for the survival of many species) combined with a conditional view (i.e., zoo standards must be met and enforced). Further, in Vignette 3 Jillian expressed concern that zoos in Ontario do not consistently meet these standards (Jillian, Field Note #18). Jillian’s mixed views on zoos were also apparent in several of her interview responses, in which she expressed both support for, and concerns about, zoos.

I think if they are a good zoo like the Toronto Zoo they do a lot to help educate the public and to help the animals in general whenever they can and I think that’s what zoos should be for and if they are not . . . , they should treat the animals well or they shouldn’t be there at all. (Jillian, Interview #2)

I think they are good in a way because they let people kind of inform themselves about what kind of animals are really out there because I mean no one would see them any
other way. But the fact that they are caging beautiful animals is kind of hard. (Jillian, Interview #1)

Other students similarly revealed mixed views (i.e., concurrently for and against zoos) during their interviews, particularly when asked: How do you feel about zoos in general? Why?

I think they [zoos] are good in a way because they do help with animals that are going extinct, they help keep them alive. But then in a way it’s kind of sad because they don’t have a lot of places to run and be free. But it does help them in the long run, so I don’t know. It’s kind of an iffy question. (Julia, Interview #1)

They [zoos] are good. Sometimes it can be a little overwhelming when you see so many animals in one little space. But then again, I don’t know—they are treating them well. At least they are not going to be depending on nature, let’s say they are not going to be . . . They may get killed by other animals or even us hunting. Or their habitats may be lost and they will die. So, it is a good thing, in a way. (Calvin, Interview #1)

The teacher also held a mixed view on zoos (i.e. views in support of zoos, as well as concerns about zoos). This is exemplified in the quote below and through dialogue with the students in Vignette 1.

I am in favour overall of regulated zoos and I think zoos have a role to play. When you go to a zoo, you do feel partly bad for some of those animals. It’s definitely a different life than if they were in the wild, but whether they would have survived or not, that’s a difficult question. I think zoos are playing a role that’s important and it’s a necessary thing and the education component is important. If you don’t have zoos, then you would never connect to them [wildlife] and never even be aware of what is out there. Documentaries, some kids like documentaries, but a lot don’t. They tune them out. So that’s where zoos are especially important—for those who learn from going to the zoo. I think the education program at the Toronto Zoo is phenomenal. I think it would be nice if all zoos had that same level of programming. It would be nice if they had more. It’s a shame when their funding is cut back because ultimately there should be more there. I think a lot of zoos should be shut down. Like ideally if more money could be sent to certain ones that would be ideal. Regulations need to improve. (Logan, Interview #2)

After closely examining numerous other examples of mixed views on zoos in the data, it became evident that the combinations of aspects for and against zoos in these views were too diverse to code into meaningful categories. I therefore decided that in order to probe more deeply into the perspectives on zoos held by the teacher and students I needed to examine the views in support of zoos and against zoos in separate analyses. Through these analyses three
significant themes relating to the participants’ views in support of zoos emerged, as well as three significant themes related to the participants’ views against zoos; these are described in the sections that follow.

**Views in support of zoos: Perceived benefits.** The nature of the students’ and teacher’s views in support of zoos centered on the notion that they have many potential benefits to offer people and animals, and can be further categorized as follows: (a) zoos provide enjoyment for people; (b) zoos educate and inspire people; and (c) zoos can be beneficial to animals by helping or protecting them. Recall that in the data, views in support of zoos were often paired with concerns about zoos, or were qualified by certain stipulations or limitations, and are represented as such in the section titles below by the notation “. . .”.

**Zoos provide enjoyment for people, however . . .** The students often expressed the view that people experience enjoyment from zoos. Many students commented on positive experiences they had personally experienced during previous zoo visits. For example, “I think it is fun to see all these animals that you never get to see,” (Jillian, Interview #1); “Anything about the zoo is good. I like to see all the animals,” (Calvin, Interview #1); and similarly:

. . . just seeing animals that you don’t see every day, like lions and alligators. Stuff you wouldn’t see in your backyard. It’s just interesting to see things, like, giraffes or something like that. Just something you’d see in Africa every day. So it’s just neat that way. (Julia, Interview #1)

The teacher also held the view that a benefit of zoos is the potential to provide enjoyment for people, “you are there [at the zoo] to take part, to learn, but also to enjoy things” (Logan, Interview #1). Recall in Vignette 1, Logan shared this view with his students, stating that enjoying their field trip to the zoo was important (Logan, Field Note #4). This view was echoed in Logan’s second interview.

I mean ultimately over the years you learn their roles that they [zoos] want to play. You look at their mission statement and conservation education is obviously important, and
they actually are an entertainment place. They don’t call it entertainment there, but they provide enjoyment and they have a role to play in society . . . (Logan, Interview #2)

*Zoos educate and inspire people, however . . .* For many students a for-zoos view related to their potential to inspire and educate people about the natural world. For example, a student named Lily shared this view in her interview sessions, as was depicted in Vignette 1: “I like zoos. I think they are good. They are educational,” (Lily, Interview #1); and “It’s good that people can go to zoos because then they learn more too,” (Lily, Interview#2). This view was shared by other students as well, “[zoos] provide info to the public” and “inform public about the environmental problems we need to fix/solve” (Ben, Survey#1); and:

I like them [zoos] because kids can learn from them. Not just kids, but other people too. But I know a lot of people don’t like them, because they [animals] are in captivity. But I feel that you can learn from that and it’s beneficial to people. (Charlie, Interview #1)

In Vignette 3, Jackie, Jillian, and Tessa also shared the view that zoos educate people during their PowerPoint presentation (shown in the slide below).

![What Zoos Do](image)

*Play a big role in conservation, breeding endangered species to release them back into the wild.*

*Provide public education about the species of wild animals kept in the zoo and their natural habitats.*

*They conduct research and learn more about the animals in the zoo, so they can help those left in the wild.*

(Jillian, Tessa, & Jackie; Zoo Standards PowerPoint Presentation)
The girls also separately shared this view during their one-on-one interview sessions: “I think if they are a good zoo like the Toronto Zoo they do a lot to help educate the public . . .” (Jillian, Interview #2); “Zoos are good because they’re doing a lot to inform people about conserving biodiversity of wildlife” (Tessa, Interview #2); and “They [zoos] are a good way to show younger kids and like, everyone, how important animals are . . . Because they help the community realize, how to become knowledgeable on the subject of animals becoming extinct” (Jackie, Interview #1).

The view that zoos can inspire and educate people about the natural world through a firsthand experience with wildlife was a significant and recurring theme in the teacher’s exchanges with the students. For instance, recall from Vignette 1 that Logan shared with his students, “we won’t get the awe of wild animals without the zoo” and “most students don’t consider science videos to be exciting and don’t always connect to nature when watching them. The zoo helps you connect to nature firsthand” (Logan, Field Note #6). The teacher’s view that zoos provide people with an “appreciation by seeing” was repeated during his interviews:

One of the themes that we talk about is stewardship, environmental stewardship, and it’s important that students realize that we have a responsibility for the world that we have. So basically to get students to realize, to want to appreciate the biodiversity the planet offers. One of the things that I think the zoo does, is it presents animals from around the world and some of the different issues so that students can have a firsthand knowledge of it. To watch a video, say on African Savannahs, doesn’t give you enough of a clear connection, where if you can actually see the animal there, you get a much greater sense of wonder and realize the importance of preserving it. Whereas something on a video that’s another continent away, you don’t really think about too much. If you know it is not going to affect me actually if that animal is no longer there, where if you actually see it, you appreciate (Logan, Interview #1)

If a kid doesn’t see the actual animal up close, they are not going to appreciate the pure majestiness of it and so by assuming that they are going to appreciate it as much by watching a video on TV or reading a pamphlet on, oh, let’s support national environment, I don’t think it’s a complete translation. (Logan, Interview #1)
Logan viewed education as the primary purpose of the zoo field trip experience. This view was depicted in Vignette 1, when he stated “We don’t go on a field trip just for fun. There should be an educational component to it as well” (Field Note #4), and this view was reiterated during his interview, “I bring students to the zoo probably for a bit of both [education and entertainment], but more predominantly education’ (Logan, Interview #1).

Logan additionally believed that the zoo had the potential to create real-world connections to science for his students.

Well one of the things is that the zoo trip actually fits nicely I think with a Grade 11 course because traditionally, this course has been strictly taxonomy focused and it has been a bit overwhelming for the students because of the amount of content and there has been no real connectedness between that component and the environment or the real world. And the nice thing with the zoo trip, and especially actually developing it into a mini unit, is that it basically connects that material there, so therefore the biodiversity which we study in looking at the taxonomy of organisms - we can see the importance of taxonomy as it relates to conservation, the fact that this is why we are classifying things. Some of the students say, well why do we bother classifying? Well one of the reasons why is to analyze what biodiversity we have and to conserve that and realize the importance of it. (Logan, Interview #1)

And definitely I expect, the non-traditional learning setting is important too as well, because it connects science to – people will always go to the zoo and they will connect science and will remember that kind of lesson growing up and it brings back memories too when you take kids there and they see it. (Logan, Interview #1)

The fact that it [the zoo] is one of the few places that students can ultimately connect science, once they leave high school even if they don’t go on to study in the sciences, and a lot of students have a natural interest in animals and preserving nature, so it’s a great opportunity to see them up close, where they wouldn’t normally be able to see them. (Logan, Interview #1)

In further describing the positive educational value of zoos Logan used descriptive phrases such as “zoos give visitors food for thought,” as depicted in Vignette 1. He also used metaphors to describe the educational value of zoos, such as: “zoos are a piece of the puzzle,” and “zoos are a spring board” for teaching and learning about biodiversity and wildlife.

I think the zoo gives you a lot of times, food for thought. And how you—it’s a piece of the puzzle I think. A piece of the puzzle, I mean obviously it’s a reason for studying
science for one, and two, it’s a piece of the puzzle in teaching students about biodiversity and it’s connecting the things like—your own experiences outside, whether it be camping and conservation and the need for basically exposing kids to the natural environment. Saying it’s important and trying to teach the students to go out in nature because they don’t always—haven’t always been exposed to it. So you obviously want them to understand a little more and understand the fact that we are a small part of the diversity we see in the world and our responsibilities in this world. (Logan, Interview #1)

It’s spring boarding—that’s the whole idea. Basically, at the end that might be the justification for zoos. A spring board. To see the animal there and say you know what, this is the animal, and start looking at wildlife. It’s a good reason to have zoos for that reason alone. (Logan, Meeting)

Zoos help and protect animals, however . . . The students often reported that their views were tied to zoo efforts to help and protect animals. For example, “I like how they [zoos] help all the animals and stuff so I think it’s a good thing” (Bobby, Interview#2); and “I think if they are a good zoo like the Toronto Zoo they do a lot to help the animals in general whenever they can and I think that’s what zoos should be for” (Jillian, Interview#2). Another example comes from a student named Liam:

They [zoos] are good because they are trying to help the animals in whatever way they can . . . I have always thought that zoos were good and that they help out the animals from say like poachers, helping them out that way, or if they are sick. (Liam, Interview #1)

The students’ views often specifically related to zoos helping and protecting endangered species through conservation efforts. For example, “If they [zoos] are used to save animals and conserve wildlife, then they are good of course . . . I think zoos are good in general (Lily, Interview#2). Several examples of this view were found in the data, including: “I think they [zoos] are good . . . I think it’s good for conservation efforts” (Ian, Interview#2); “Because they are keeping animals from becoming extinct, so there may be negatives, but there are a lot of positives to zoos” (Bobby, Interview #2); “They [zoos] aid in conservation and research of endangered species. They assist organizations with research” (Charlie, Survey #2); “I know that they [zoos] try to help the populations of animals, trying to help the endangered species” (Julia,
Survey #2); and lastly, “Most of the time they are fairly good at conserving whatever type of animal or species they have in their zoo” (Calvin, Interview #1).

A theme in the teacher’s views in support of zoos was that they benefit animals by providing a home for those rescued in the wild, or for animals confiscated from, or abandoned by, people who tried unsuccessfully to keep them as pets. For example, in Vignette 1 Logan shared in his PowerPoint presentation the example of a Serval Cat rescue by the Toronto Zoo, (Field Note #4). Logan restated this view during an interview session: “Quite often, a lot of the zoo animals at the Toronto Zoo, in particular, have been rescued from other private zoos” (Logan, Interview #1); and again in the class during another lesson, “. . . many people end up not being able to take care of them [wild animals] and they end up at the Toronto Zoo” (Logan, Field Note #3).

In addition, the potential benefits of zoo conservation efforts were also a recurring theme in the teacher’s responses. For example, during our first interview session Logan made the following comments: “the zoo is one of the biggest areas working towards conservation”; “I think zoos are necessary for conservation projects”; “definitely as far as wildlife conservation – that’s one of the main goals of the people that work there [at the zoo]” and:

Well most of them do have pretty extensive species breeding programs, survival programs. And they have the ones that deal with the frogs, FrogWatch Ontario, and also the wetlands and habitats. And so I think it’s a number of different initiatives that they are focusing on, not only a lot of public ones, but a lot of other ones too as well and working with a lot of conservation organizations, to sponsor them. (Logan, Interview #1)

Logan also listed the following as ways that zoos help conserve wildlife and wild spaces in a survey response: “education of public; participation in global restoration/population issues; breeding of endangered species; and working with other zoos and aquariums and environmental groups” (Logan, Survey #1).
**Views against zoos: Concerns and objections.** Analysis of the data revealed that the students’ and teachers’ concerns and objections relating to zoos can be categorized into three main areas: (a) the captivity of wild animals in zoos (i.e., confinement in unnatural habitats); (b) standards of care for zoo animals in perceived substandard or poorly managed zoos; and (c) the use of zoo animals for entertainment purposes.

Recall that the teacher and the majority of the students held mixed views on zoos and therefore views against zoos were often paired with views in support of zoos. Stand-alone against-zoo views were rare with one notable exception, those expressed by a student named Jacob. His concerns and objections relating to zoos were shared repeatedly over the course of the study as exemplified in Vignette 5, in which he wrote “I hate zoos!” (Jacob, Interview #1; Jacob, Zoos and Conserving Biodiversity Dilemma Cards Assignment). Thus, Jacob’s responses in the following sections were most often not paired with a view supporting zoos, in contrast to the majority of the students’ and the teacher’s responses.

... zoos keep wild animals captive. The students’ concerns and objections often related to the confinement of wild animals in captivity. Vignette 1 illustrated this point of view when Jacob proposed that people should see wild animals on safaris instead of in zoos (Jacob, Field Note #6). During our interview session Jacob reiterated this view: “I hate them [zoos]. I don’t like how they put animals in cages, but safaris would be better”; “Everything should be able to live naturally. We don’t cage people, why animals?”; “To make it better for animals they need to make it more open for animals and less caged in,” and:

Jacob: It’s still not right to have animals in zoos and caged up and it is not the same as having them in the wild. If an animal can’t survive in the wild then putting it in a zoo . . . it’s like putting someone in the hospital that is ill. Do they want to be there or do they want to be out living life to the fullest?

Jennifer: What about enrichment activities for zoo animals? Like mimicking natural foraging behaviours with the gorillas?
Jacob: A little better, a good idea. Not quite the same as the wild. It is better than like hand-feeding them food.
(Jacob, Interview #1)

Concern about the confinement of animals in zoos was also found in Jacob’s survey response:

I think zoos kidnap animals from their natural habitat to make money, and study the animals for their benefits, and keep them caged, with little room, or any natural habitat, so if they were ever released back into the wild they would not be able to function properly. (Jacob, Survey #1)

Concern over the confinement of wild animals in zoos was also found in other students’ interview responses. For example: “I don’t like how they keep animals in cages sometimes. I think they [animals] should be more free” (Tessa, Interview #1); “Seeing the animals in the cages. You see this beautiful animal in the cage, it’s kind of depressing” (Jillian, Interview #1); and:

Ben: They [zoos] are all right. Like it’s good to have a couple zoos.
Jennifer: Why is that? Do you think there should be a limit on the number of zoos we have?
Ben: Well, to limit the number of captive creatures in cages.
(Ben, Interview #1)

Some students expressed the view that animals might be experiencing negative feelings or emotions in captivity, suggesting they held an anthropomorphic view of zoo animals. For example, during the visit to the gorilla exhibit described in Vignette 2, Bobby stated that the gorilla looked depressed (Bobby, Field Note #5). He later commented on his perception of how zoo animals might feel about being in a zoo compared to the wild:

Bobby: Umm, they [zoos] could be wrong in a way, but it’s really interesting.
Jennifer: Why do you think they could be wrong?
Bobby: Well because animals might feel like they’re not in their habitat.
(Bobby, Interview #1)

Another example comes from Jacob, who stated that the rhinos must be bored and that they didn’t like their enclosures, as depicted in Vignette 2: “It looked like they were bored and didn’t
get to do anything. One seemed angry because it smashed the door even when they opened it, so I guess they don’t like it there” (Jacob, Interview #1).

The teacher also expressed concerns about zoo animals in captivity during his interviews, stating that seeing animals in zoos can be disconcerting, disheartening, or that he felt badly for them.

Jennifer: Is there anything that you don’t enjoy about visiting the zoo?
Logan: You like to see animals in their native habitat. It is a little bit disconcerting to see them in an environment where they wouldn’t necessarily be located. And it’s disheartening. But with that said, at times there are reasons for it as well. And you have to take a look at those reasons and the efforts, but it’s disheartening because you wish that there was never a need for zoos, that basically there wouldn’t be issues of organisms becoming endangered and that we could appreciate them much more so in the natural environment.
(Logan, Interview #1)

When you go to a zoo, you do feel partly bad for some of those animals. It’s definitely a different life than if they were in the wild, but whether they would have survived or not, that’s a difficult question. (Logan, Interview #2)

. . . some zoos have questionable standards of care. For some of the students, concerns and objections relating to zoos stemmed from the perception of poor conditions and/or treatment of animals in what they deemed substandard or roadside zoos. In Vignette 3, Jackie, Jillian, and Tessa shared descriptions and specific concerns related to roadside zoos during their PowerPoint presentation. These students also expressed concern over the regulation of zoo standards in Ontario. These views are highlighted in the sample PowerPoint slides below.
Roadside Zoos

Roadside zoos are known for:
- housing animals in small, barren cages that are not specialized in any way for a particular animal
- inexperienced staff
- undersized cages and enclosures that prevent normal movement and behaviours
- Bored and frustrated animals showing abnormal behaviours such as:
  - pacing
  - rocking back and forth
  - self-mutilation
  - increased aggression

Roadside Zoos

Roadside zoos pose a threat to the health and safety of humans as well, they contain:
- poorly constructed cages
- weak, flimsy fences and enclosures for potentially dangerous animals
- unlocked cages and gates
- [http://www.ontariozoos.ca/](http://www.ontariozoos.ca/)
Jillian expressed concern about poor standards of care for zoo animals and the need for greater regulation of zoos in Ontario, with comments like: “If you are going to keep animals in captivity, do it right or don’t keep them at all!” and “Ontario is the worst in Canada. We have few regulations in place, other than for abuse of animals” (Jillian, Field Note #11). Jillian’s strong views on the need for higher standards of care for zoo animals were also revealed in Vignette 3, particularly when she responded passionately to students laughing at a video of distressed baboons in a roadside zoo (Jillian, Field Note #19).

Other students similarly expressed concern about perceived poor standards of care for zoo animals. For example, Calvin stated, “Certain ones [zoos] do a good job. Others don’t do a very good job. Not that I know which ones don’t do a good job, but you hear sometimes” (Calvin, Interview #1); and:

Isaiah: I think they [animals] are like locked up once in a while. They don’t treat them as good as they should. Certain zoos. Toronto Zoo is good.
Jennifer: Have you ever seen an animal being mistreated at the zoo, or is this just something that you think might happen?
Isaiah: Just something I think about.
Jennifer: Now you mentioned in the previous response that you were concerned about the treatment of animals.
Isaiah: Well, it’s like certain zoos. Because I went to Rossville Zoo and it doesn’t seem like they treat them as good as they can. Because they are in small cages and stuff like that.
Jennifer: I haven’t been to that one, is it a smaller zoo than the Toronto Zoo?
Isaiah: Yeah, smaller, but they have lots of animals there and stuff. Not as good as they could be.
(Isaiah, Interview #1)

Concern about the treatment of animals in perceived substandard zoos was also a common theme in the teacher’s views. He saw zoos as a heterogeneous group, whereby he deemed some zoos better than others, as illustrated through his comments to the class in Vignettes 1 and 4. Logan shared with the class, “Yes, in some places they [animals] don’t have enough space. At the same time, Logan observed that “a good zoo has enough space for natural behaviours” (Logan, Field Note #3), and:

You also see that not all zoos are the same. In some zoos the animals are in a more cruel environment compared to others. There are ways that we, there are some standards we have to create as well, for zoos in general. Many zoos actually are quite inhumane, even outdated. Because basically if they don’t belong to a society that controls them, most of them would fail. I mean we have that survey done by WSPA on the conditions in Ontario zoos and only a few zoos actually passed. (Logan, Field Note #2)

... zoos use animals for entertainment purposes. The students expressed concern and objections related to using zoo animals for entertainment purposes. This position was illustrated in Vignette 1 when two students, Roberto and Ben, emphatically stated that entertainment was not a sufficient justification for zoos (Field Note #6). Concerns about using animals for entertainment in zoos were found in other students’ interview responses as well. For instance, “I still disagree that zoos should be for entertainment purposes... When they start actually training animals, I think that’s wrong” (Ian, Interview#2).
The teacher also expressed concern about using wild animals for entertainment purposes in zoos and aquariums. This was illustrated in Vignette 1 when Logan shared, “I’m not a big fan of circuses. I don’t think it is right to domesticate those animals. I see it as a continuum between circus and African Savannah. Zoos are somewhere in the middle” (Logan, Field Note #6).

Logan’s concerns about zoos using animals for entertainment included issues around zoo exhibit design. He recognized that zoos have a need to design exhibits to accommodate both an animals’ needs for “privacy”, comfort and space, and visitors’ expectation to be entertained by having unobstructed views of zoo animals. In Vignette 1 Logan asked his students to reflect on this issue when he asked, “Where does the balance lie? If you were designing the exhibit, is the purpose for entertainment or for the animals? The problem is the larger the exhibit, the better for the animals, but people can’t see them as well” (Logan, Field Note #6). This issue was addressed by Logan on more than one occasion, as illustrated below:

A good zoo has enough space for natural behaviours. Students often complain about the long walking and how they can’t see animals up close but this is for the protection of the animals, they are not catering to the visitors. (Logan, Field Note #3)

It’s a fine line, they are caring for the animals and they are entertaining the crowds, and that’s a difficult line, I mean do you deserve to fail because you have an entertainment factor to uphold? You know that’s tough. (Logan, Interview#2)

This point of view was echoed by a student named Lily, who shared the following response in her interview:

I don’t know if they [zoos] are doing absolutely everything they can. Maybe they are doing a little bit much for like entertainment . . . Like maybe they are doing too much for the public, to see the animals. They could be doing more for the animals. It could affect the animals, people being around all the time, I don’t know. (Lily, Interview#2)

Lily’s comments reflect her concern about animal welfare conflicting with entertaining visitors.
Evolving Student Perspectives

An additional significant theme that emerged through analysis was the evolving nature of the students’ views on zoos. More specifically, it was found that the students’ perspectives on zoos evolved over the course of the study, as shifts occurred in: a) the emphases placed on views for and against zoos; and b) conceptualization of zoos and their roles in society (i.e., as zoos started to be seen as: (i) a heterogeneous community, and (ii) centres for biodiversity conservation).

**Shifting emphases for and against zoos.** As the students’ perspectives on zoos evolved, shifts toward greater emphases for or against zoos were observed. For some students, an appreciation of zoos grew as they became more knowledgeable about zoos and their missions, and support was therefore strengthened. For other students, learning more about zoos meant shifting away from a naïve or simplistic for-zoos stance as they became aware of aspects of zoos that they deemed unfavourable, most especially related to roadside zoos. For these students, a shift toward increasing concern or objections relating to zoos occurred.

For example, Tessa commented that she “learned a lot” and developed “a more positive outlook on zoos” (Tessa, Interview #2). Another student, Julia, made similar a comment about a shift in her views, “now I like them [zoos] a lot more after going through the misconceptions4 and seeing how much they actually do for the conservation of animals (Julia, Interview#2). Jillian was particularly reflective on her shift toward a more supportive view of zoos, as was

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4 The terms “misperception” and “misconception” were used interchangeably by the teacher and students, and can be found in the participants’ quotations cited in this report. The term “alternative conception” is more commonly found in the science literature focusing on conceptual change (see for example, Duit & Treagust, 2003; Treagust & Duit, 2008), and I have therefore elected to use this term in the writing of this report. For elaboration on usage of these terms please refer to the subsection entitled “Alternative conceptions” in Chapter Six.
illustrated in Vignette 3. During her second interview she revealed that learning more about the zoo staff’s care and treatment of animals was significant to this shift:

I didn’t really know what I felt about zoos because I didn’t know anything about them and I kind of felt that they were just caging animals, and some of them are, but definitely my views on the Toronto Zoo have changed . . . For the better, yeah. (Jillian, Interview #2)

The guy that was taking care of the rhino, he was all proud and they actually have a certain feeding time and if they are not happy, then they try and do something about it or there’s a reason for it and they do take care of their animals. (Jillian, Interview #2)

And I think it made me feel better that there was actually science behind what they were doing and the reason that they had the animals there. It was more of a comforting thing. (Jillian, Interview #2)

Charlie’s initial for-zoos stance was tied to his belief that “people can learn from zoo animals,” which in his opinion outweighed concerns associated with keeping animals in captivity.

I like them because kids can learn from them. Not just kids, but people too. But I know a lot of people don’t like them, because they are in captivity. But I feel that you can learn from that and it’s beneficial to people . . . the fact that they are in captivity, that doesn’t bother me because I know that, I don’t know those people that tend to argue it, I feel they don’t really have a strong enough point, but because they are there and you can learn from it and like before, it just kind of outweighs it. (Charlie, Interview #1)

As he became more knowledgeable about the potential benefits of zoos, his support for zoos grew stronger: “I had a positive outlook before, but now I have a more positive outlook because before I didn’t like know about the behind-the-scenes stuff and now I do, so it is just better” (Charlie, Interview #2); and:

They [zoos] are good. They do a lot. They do a lot more than people think they do and we learned that. I learned that from seeing those videos and going there and actually listening to what they actually do when they talk to us. They are definitely doing a lot. (Charlie, Interview #2)

Jacob’s against-zoos stance did not change, but after the unit of study he indicated that he felt better informed about zoos and acknowledged that they had the potential to benefit wildlife.
For example, Jacob stated: “I know what they do more behind-the-scenes and how they help them [animals] but my opinion hasn’t changed. Everything should be able to live naturally. We don’t cage people why animals”; “I am biased against zoos—don’t like them. [The] unit didn’t change this. I’m more informed, but have the same feelings”; and “Don’t like zoo part; don’t like them being caged, but important to maintain species” (Jacob, Interview #1).

Another example comes from Jacob’s responses before and after our unit of study to the following survey question “List as many ways as you know that zoos help conserve wildlife and wild places.” Recall his first response to this question:

None. I think zoos kidnap animals from their natural habitat to make money, and study the animals for their benefits, and keep them caged, with little room, or any natural habitat, so if they were ever released back into the wild they would not be able to function properly. (Jacob, Survey #1)

In comparison to the first response, his second response reflects a more informed view on the roles of zoos: “[Zoos] give some animals with lost habitat a place to live, and food; create special diets for different species; and try to mate endangered animals to increase the population” (Jacob, Survey#2). And lastly, in Vignette 2, Jacob’s reflections on the behind-the-scenes tours at the zoo included a reinforcement of his firm against-zoos stance.

Going through the Animal Nutrition Centre I learned more specifics about how they help wildlife, but it didn’t change how I feel about things . . . about zoos. I don’t like how things are done. To make it better for animals they need to make it more open for animals and less caged in. They need to let them interact with other species. They need to change up the animals at different zoos to see if they react differently with different individuals of the same species. For example, one rhino was aggressive, but might be less aggressive with a different rhino.” (Jacob, Interview #1)

**Shifting concepts of zoos.** Changes in the students’ conceptions of zoos and their roles in society were observed, as the students began to view zoos as: (i) a heterogeneous community, and/or (ii) centres for biodiversity conservation. Jillian’s responses on her second survey exemplify how she experienced these changes in her views on zoos:
I feel differently about zoos and what they do to conserve wildlife, and I’m more educated towards roadside zoos and what can be done to stop them. I also learned about some of the various organizations that conserve wildlife and how I can help them. (Jillian, Survey #2)

**Zoos as heterogeneous community.** In developing a broader understanding of zoos, the students began to identify zoos as being part of a “heterogeneous community” (Fàbregas, Guillén-Salazar, & Garcés-Narro, 2012). In this way, some students began to see that within the zoo community, practices and standards among individual zoos are highly variable.

This evolution of views was especially true for Jackie whose group’s action project on zoo standards was highlighted in Vignette 3. Holding a mixed view on zoos, Jackie’s concerns about zoos became stronger as she became more cognizant of provincial regulations of zoos in Ontario and the differing standards of practice among zoos. In her second interview, Jackie makes repeated mention of her stance against roadside zoos: “After doing our project and seeing how many zoos are unsafe and animals are just caged up, they are like domestic animals, they don’t have any freedom, it’s kind of sad” (Jackie, Interview #2). And she further reflects:

> I think we need stricter laws for zoos. Because like I said, I can even own a tiger, as long as I don’t abuse it or mistreat it . . . I didn’t realize how many zoos are actually roadside zoos, aren’t treating the animals correctly, how they are supposed to be. (Jackie, Interview #2)

**Zoos as conservation centres.** Another significant theme in the students developing a broader understanding of zoos was conceptualizing zoos as centres for biodiversity conservation. A response in Ian’s second survey exemplifies this change: “My knowledge has also grown about the role that zoos play in their efforts to conserve biodiversity and wildlife” (Ian, Survey #2). In the second round of interviews and surveys, students appeared to better identify specific examples of zoo conservation techniques, initiatives, and partnerships. Examples included references to: captive breeding; black-footed ferret and/or Vancouver Island marmot breeding and reintroduction initiatives; cellphone recycling initiative to help protect
gorilla habitat; and general zoo efforts to raise awareness and educate the public about biodiversity conservation. For example, in the second survey Tessa wrote that “the Toronto Zoo helped breed more black-footed ferrets and Vancouver Island marmots. Zoos educate people about conserving wildlife and wild places” (Tessa, Survey #2); and Liam referenced the Toronto Zoo’s cell phone recycling program which helps conserve gorilla habitat (Liam, Survey #2). References to specific zoo conservation efforts were not found in the first surveys completed by these students.

Several students reflected that they had gained a deeper appreciation for the conservation efforts put forth by modern day zoos. Some students commented on how learning more about the behind-the-scenes efforts of zoos helped them realize that zoos play a role in conservation and are not just a place for viewing animals. For example, Jillian shared, “Because I wasn’t really sure about what zoos could do about conservation. When you think of a zoo, you don’t think of conservation, but it definitely opened my eyes” (Jillian, Interview #2); and Bobby reflected, “Now I understand more about what zoos do, not just how you pay to go see the animals. They do a lot more than that” (Bobby, Interview#2). Other students shared similar positions:

Before I thought I knew a little bit and after going to the zoo and learning what they do, it gave me more information on conservation and wildlife . . . zoos have a major role in, a bigger role than I thought, in conserving and being part of other organizations or groups that specifically focus on conservation. (Calvin, Interview #2)

I never knew—like I guess I knew about . . . zoos were for saving animals, but I thought it was more just kind of for visitors to see animals. I didn’t realize how much conservation of animals takes place in the zoo. I thought it was more just for the public to see. . . . I just didn’t know too much about it. But I have learned more. (Lily, Interview#2)

In these quotes, Calvin and Lily share how learning activities in this unit led them to become more informed about zoos’ contributions to biodiversity conservation.
Zoo Staff Perspectives

In comparison to the mixed views (i.e., concurrently for and against zoos) held by the teacher and the majority of the students and the against-zoos stance held by one student, the zoo staff held a predominately for-zoos stance. This outcome was expected as zoo staff participants were being employed by the zoo or volunteering at the zoo at the time of the study. Another notable finding was that the zoo staff held concerns about poor public perception of zoos.

Views in support of zoos: Perceived benefits. The zoo staff’s views related to the perceived benefits of zoos, and can be categorized into three areas: (a) zoos provide enjoyment for people; (b) zoos educate and inspire people; and (c) zoos contribute to research and biodiversity conservation. These themes align with the main mission objectives of modern zoos (i.e., education, entertainment, conservation, research).

Zoos provide enjoyment for people. Views in support of zoos held by the zoo staff were tied to the enjoyment that they provide visitors. For example, when asked in their interview what would they like visitors to take away from their zoo visit, the zoo staff responded: “First and foremost, I hope they had a good time” (Diana, Interview); “That they have had an enjoyable time” (Brenda, Interview); “. . . that they had a fun time” (Paul, Interview); and “I hope they had a lot of fun . . . They had a good experience” (Jenna, Interview). Similarly, Russell stated in his interview:

All I know is that I have had feedback that the kids had a good day. They enjoyed it and at this point, that’s all I know, which is a good thing. If they don’t enjoy it, then you know we are doing something wrong. (Russell, Interview)

Zoos educate and inspire people. The view that zoos can inspire and educate people about the natural world through a firsthand connection was a significant and recurring theme in the zoo staff’s views. For example, Bridgette shared, “my own personal interest is very much that for a zoo, the primary focus should be the education component.” Kim shared that she
wanted to help visitors take away “knowledge and understanding; a sense that everything is tied together, and an appreciation for wild animals and all of nature; and a sense of wonder”, as illustrated in Vignette 2 (Kim, Interview).

The view that zoos educate and inspire people through a firsthand connection was also a significant theme in Russell’s responses. During his interview he stated, “I would hope that our visit is part of a bigger picture and that would be our opportunity to boost enthusiasm and get the kids interested,” and “I think the other part of it is just getting kids connected to nature and experiencing these things first hand, which is always more inspiring than just reading about them” (Russell, Interview). Later in our interview session he elaborated on this view and shared a personal connection:

The behind-the-scenes [tours] are geared so that the students get close to the animals and in my mind that sort of proximity creates—it’s hard not to create inspiration. And whether it was, they left with a love for animals or that was a moment that they will remember, that may foster some caring for conservation and animals in the future. It might inspire them to learn more in the future. I remember myself when I was young I went to SeaWorld and I touched a snake. Just for a second and I remember it. It was a great moment for me. I hope they could leave with sort of just that, sort of a love for animals and remembering that moment. (Russell, Interview)

The view that zoos educate and inspire people through firsthand connections to wildlife was also discussed in great detail by Gwen during her interview:

Well the main thing, and this is what we also try and drive home in the training of the staff that teach programs, is you want an individual to somehow make a connection with an animal or a plant or just something in nature, a scene in nature, or whatever. Make a connection because I honestly think that is when you make those emotional connections with things. That is what is going to impact you as a person and potentially influence your behaviours and your attitude. You think back to a time when you were young, and you remember a fond memory outside and it usually has to do with something really neat that you saw or a really neat up-close experience. Something that made it special. And everyone can usually recall one of those things so we want to try and have that for people when they come in for a program or when they are walking around the zoo. I think there’s plenty of opportunities for it as just a general visitor, or in our programs we always try and arrange for a special close up visit with an animal, where they can touch an animal or go behind the scenes and see an animal house and talk to the keeper and get the smells, and really make that connection and step into their world.
We definitely want to make people aware of wildlife, what’s out there and depending on the audience obviously, one of our main goals with the younger audiences is try and hook them on to wildlife, nature, and get them excited about it. How amazing it can be and so they want to get out there and explore and learn more. Then with the older audiences, definitely we want to educate them more about the conservation related side of things. Overall, just to develop an appreciation and to help them better learn how to live with wildlife and to realize that we are all connected in the world. Plants, animals, and humans and we need to learn to co-exist with each other. (Gwen, Interview)

Other zoo staff similarly shared the view that zoos educate and inspire people through firsthand connections to wildlife:

When I was younger and would visit the zoo, it sort of inspired me to love animals and I wanted to help save them and all this stuff. So hoping that a visitor’s experience would be similar to that, by seeing and doing and becoming involved that they would be more inclined to want to help and learn more. (Diana, Interview)

I would say, first of all, inspiring a respect for and an interest in nature, and educating people about living with wildlife; how we are all part of the same system, we are not separate, we are also an animal and we all have to live together . . .and that visitors took away what we always try to teach the volunteers, is that they made a connection. So somehow they were able to touch a skin and make a connection with an animal, or see an animal do something close, or whatever it is. Because every single person that works at the zoo can tell you when they were a kid what that connection was and why it led them to be here. So you know how important those connections are, and you hope that they get a connection. (Jenna, Interview)

I hope that their eyes have opened to plants and animals, the natural world and to seek other experiences like the zoo, and walking in the woods, and observing animals. So that desire to learn more and to pass it on to others. Like we know that they weren’t going to turn into complete environmental citizens, but you know you have to start somewhere, and I think it’s that spark of interest and enjoyment is huge. (Brenda, Interview)

The view that conservation education is a primary purpose of zoos was a recurring theme in the zoo staff’s responses. Russell clearly articulated this view: “In my mind, that’s our whole purpose, we are here to provide conservation education,” and “I think everything we do here, whether it has a specific theme that’s not just strictly conservation education, we are always talking conservation because we are a conservation facility” (Russell, Interview). Russell further elaborated on his views and the practice of conservation education at the Toronto Zoo during his interview:
I would say our goal is firstly to inspire people to learn more about conservation ideas and concerns. Inspire them to take actions, whether those actions are large scale, getting involved with other organizations, or us doing—for instance we do an Adopt-a-Pond, FrogWatch Ontario, and Ontario Turtle Tally. It can be inspiring people to do simple small tasks around their home like recycling, if they are not already or planting native plants in their back yards that help with our native wildlife. So the goal really is to inspire people.

I hope they take away with them a knowledge that they can make a difference in their individual lives of these large things that are going on. We teach them about conservation. Unfortunately, teaching about the negative things that are going on in our world. That’s not a nice thing. We wouldn’t have to conserve the forest if there wasn’t a problem. And we don’t want to overwhelm and scare kids. The term is ecophobia. Overwhelm them, putting too much pressure on their shoulders. So we hope that we can gently show them and educate them about what’s going on, but leave them with a sense of empowerment, what they can do in their daily life does make a difference. That’s what I hope they go away with.

Definitely, in my mind, every single program has an underlying conservation message. We always tie conservation in to our programs and trying to create goals that people have in their personal lives that they can help and try to explain how those daily small things do relate to the big picture. Programs that are specifically geared right at it, and we do have some for zoos and conservation programs for secondary students. (Russell, Interview)

Conservation education was also a significant theme in Curtis’ interview responses. He stated that, “the zoo, the living institution if you will, is a forerunner in the next wave of conservation education,” and “our main goal is to educate the public on the status of biodiversity globally and the status of biodiversity locally. I would say that has been our overwhelmingly primary goal” (Curtis, Interview). In addition, Curtis provided multiple, detailed examples on how the Toronto Zoo strives to put conservation education goals into practice, including:

Well, for both students and teachers it’s unique, in that we provide a hands on stewardship activity for them to do either by themselves or with their teacher in that class and we can illustrate to them how the data they are collecting is used to help “real scientists” manage wildlife populations. So conservation is a tricky word. Biodiversity is an even trickier word, but those two words when tied to education, become totally abstract. So what we are trying to do is give conservation education some kind of definition and I think the best definition for conservation education is stewardship, is directly applied changes to your behaviour or to the environment or to your peers that will help manage wildlife populations sustainability, so our past objective has been to provide these folks with stewardship opportunities, because they are few and far between and then I guess secondly is to lead by example and to go out and do it ourselves and sometimes we put up frog loggers and then we monitor frog populations in Southern
Ontario, but we are taking it to that next level by doing some of these applied research projects with a bit more of an empirical and rigorous basis so that we can actually, instead of just talking about other scientists in our outreach events, we can talk about ourselves a little bit and then that helps people relate better to the program. Onsite we have a kiosk, an exhibit called the Americas Wetlands and there are no caged animals. These are three wetlands that were artificially made and inside these wetlands there are the typical food web that you would find in Central and Southern Ontario. So we train the volunteers to work this kiosk and to provide touchables for students and hands on dip-netting in the wetland to give the kids who are coming to the zoo a chance to see an animal that’s not in a cage that’s found in their backyard that is vitally important to conserving wetlands, which host the frogs and the snakes and the turtles that we are trying to promote in our other programs. (Curtis, Interview)

Other zoo staff similarly shared the view that zoos educate people about conservation. In Jenna’s words, “we are all really passionate about conservation education. It’s kind of our top priority. Doing something about inspiring conservation action, making people actually change their behaviour and do something” (Jenna, Interview). Additional examples from other staff included:

The goal ultimately, of conservation education at the zoo, is to effect change in people. To develop a better understanding or knowledge, about the issues, to change attitudes, and have people take action. The goal is to make better environmental citizens. And the big thing is to make people care. (Brenda, Interview)

I want to make everyone familiar with what conservation is, how important it is. Why we need to be thinking about these things and then again promoting the message of how the zoo is involved in conservation in the different avenues and relating it to how they can become more involved. (Janet, Interview)

To make people aware of what’s going on around them. Even as close as the Rouge Valley Conservation and doing clean up nearby here or further on, and what’s going on with tigers across the world and things like that. So making people aware of what’s going on and what they can do to help and stop doing to help. And just keeping everyone in the know. A great example is our EcoCell program which I am sure you have heard a lot about by now. So that’s a great one. . . . But that along with our Adopt-a-Pond program sort of just getting people aware of wetlands and reptiles, amphibians in Ontario and across Canada. And then I guess education through our specific educational programs. There’s always a conservation message that comes across in them. (Diana, Interview)
Another recurring theme in the zoo staff’s responses was the view that zoos teach science concepts to visitors. For instance, Russell shared some examples of how zoo programs are designed to align with school science curriculum objectives:

I would say [our programs are] 99% science. Yes. We are capable of taking on other stuff, art or geography, but it is a special request, and it’s not a regular thing. So that’s why I say 99% science related and our programs are all tied with curriculum. (Russell, Interview)

An examination of zoo workshop scripts support this point, as each of the scripts clearly specifies how zoo workshop learning objectives align with Ontario school science curriculum objectives.

To support his view that zoos educate people about science, Curtis shared specific examples of zoo programs (onsite and outreach) that align with science curriculum objectives in Ontario, as well as programs that engage visitors in authentic science practice:

So in regards to our basis in Ontario curriculum, we have developed three main curriculum guides which you have now. One is the Wetland Curriculum Guide, the other is Turtles in Ontario Curriculum Guide, and the other specifically addresses the Eastern Ontario Massasauga rattlesnake. So these three very detailed resources draw directly from the Ontario science curriculum and we try to connect with the goals and the objectives of the Ontario science curriculum with something directly applicable to biodiversity conservation which is broadly wetlands, more specifically turtles, and then more and more specifically, a single species, the Massasauga rattlesnake. So then the science student, the science teacher can go online and download the whole thing for free or they can call me and get a hard copy and they can incorporate this sort of case study, if you will, into their classroom.

The citizen science monitoring programs that we have include FrogWatch Ontario, the Ontario Turtle Tally, and Canadian Wetland Registry. So these three programs encourage citizens to become scientists. We empower them with the tools and resources necessary that the data they collect is actually valuable. And then the Adopt-a-Pond coordinator accepts all of that data coordinates it in three different databases and allows the citizens to view the data and work with it if they want. But eventually it all gets shunted to the Minister of Natural Resources and their scientists at the Natural Heritage Information Centre use the data in a longer term project. But then secondarily, there’s also the applied research that we have and we have both volunteer and research students help collect data, for example, the project we have in the Rouge Park on turtles, most of the data, if not all, over the last seven years, was collected by college and university students.

As an example, the FrogWatch Ontario program is coordinated by Adopt-a-Pond. It’s a citizen’s science program where we provide resources by way of field identification
guides, laminated guides with our own artwork, posters, frog call CDs that they can learn the calls of the different species in Ontario, and protocol manuals for them to go out, collect distribution data on these animals in the wild and send it back to us. So the project is FrogWatch, the resources are the tools they need and this same theme is extended to two other major projects which would be the Ontario Turtle Tally following the same sort of resources and the wetland guardians database. (Curtis, Interview)

The zoo staff also held the view that zoos educate and inspire people by offering support to students, parents, and teachers. For example, Russell commented, “I answer individual questions regarding questions of interest or helping with assignments, stuff like that” and “I get more questions from parents who can’t answer homework questions. It’s kind of funny” (Russell, Interview). In Vignette 5, students in Logan’s class were made aware that zoo staff members were available to answer questions about the zoo and conservation initiatives, even after the zoo visit. The students were also made aware that the zoo staff supported their classroom-based action projects, and that the option to incorporate an existing zoo conservation initiative into their own action project was available such as recycling old cell phones and dropping them off at the Toronto Zoo to support gorilla habitat preservation; or showcasing action project posters on zoo grounds to increase awareness about a conservation issue or initiative (Logan, Field Note #8).

Russell also shared that in striving to meet educational goals, the zoo staff support teachers with resources that complement zoo visits: “all of our workshops should, and a lot of them do at this point, have teacher booklets that go with them so they have pre- and post-activities in there.” He also commented that the zoo staff adapt programs as best they can to meet the needs of teachers:

When we do special programs, a teacher may come in and want something a bit unique, say for example an anthropology focus, in which case we do the best we can to put that together for them. We can do tours with our volunteers that are sort of specific to teacher’s requests, so we are pretty adaptable in that sense. (Russell, Interview)

Being open to adapt zoo programs to meet the needs of teachers was echoed by Kim:
We know sort of what they [teachers] want and the tours are geared to the age level and the curriculum. But the teachers quite often, they will want something different than that. So you never know. You have to adapt. Adaptability is number one. (Kim, Interview)

Paul similarly supported the view that zoos successfully educate people by commenting on overall satisfaction with zoo educational programs:

They keep coming back, there’s a lot of what you might call repeat business which means that they are satisfied with the program - the schools, the teachers. And I think that is good information. That’s a good way of figuring that they do . . . come because they enjoy it, they know it’s a worthwhile program. (Paul, Interview)

**Zoos contribute to research and biodiversity conservation.** The view that zoos contribute to research and biodiversity conservation was another recurring theme in the zoo personnel’s views. For example, during our interview sessions, some staff members commented that “zoos are critical to conservation education and conservation efforts” (Curtis, Interview); and “. . . zoos are passionate about conservation" (Gwen, Interview). In Vignette 6 Russell similarly shared this view when he stated in his presentation to Logan’s class that “zoos are now conservation centres” (Russell, Field Note #5). In his interview Russell similarly stated his view that “we are a conservation facility” (Russell, Interview).

In support of the view that zoos contribute to research and conservation, some of the zoo staff cited specific examples ranging from local to national and even international initiatives:

Our goals would be population management so reintroduction, captive breeding, research into reproductive physiology and then if you go down the ladder even further, within some of the programs like the Adopt-a-Pond, specifically doing applied research to help local biodiversity survive in the natural setting. (Curtis, Interview)

Curators sit on external committees for recovery teams—are you aware of the national recovery teams? For instance, there’s a bird called the Eastern Loggerhead Shrike and the bird curator sits on that. It’s a team of biologists around a table and they plan how to bring that species back. The black-footed ferret is another example. It’s quite a lengthy process, maybe up to five years. Where are we now? What research is needed? And then what planning for the future, do we need to obtain habitat or reintroduction programs? That kind of thing. And it’s all put out in a big master plan. And the Toronto Zoo curators in particular sit on a number of these national committees and one of the roles curators bring to the table is public awareness and marketing, taking that message and
putting it up on an exhibit, it may see visitation of 1.2 million people. (Bridgette, Interview)

And if there’s a conservation message in another country we are working with educators in those countries, for instance Barry Graham⁵ with the Puerto Rican community, he did posters for the community and went into schools and gave talks like I do in Kenya and Uganda. You go into the schools there and talk to the students. Just like we were saying here. It’s not the older folks that are picking up conservation. It’s the younger generation that we are targeting overseas as well. And it’s resources because we are relatively wealthy in relation to our third world partners. So we can funnel the money to them for that purpose so that the money goes directly into the conservation there. But it’s not just for the animals, it’s for the education component too. And I think you will find all the North American zoos appreciate that. It’s almost a one to one expenditure. It doesn’t matter if you are trying to safely enforce for a tiger, if they are out there hacking down the habitat because the farmer is trying to plough his land. So we are out trying to work with the farmer too. (Bridgette, Interview)

The zoo staff also cited Toronto Zoo documents, resources, and website to support their view that their zoo is an organization that positively contributes to research and biodiversity conservation. For example, a Toronto Zoo brochure entitled “Vancouver Island Marmot: Conservation and Breeding Program” (Toronto Zoo, n.d. b) was referenced, as it details zoo efforts to “increase our understanding of this unique mammal” and to “spearhead studies on mating behaviour, pup development and hormone analysis for monitoring reproductive cycles of breeding females” for a “triumphant return to the wild.” Another example cited by the zoo staff was the Toronto Zoo pamphlet entitled “Black-Footed Ferret: Conservation and Breeding Program” (Toronto Zoo, n.d. a). Here it is written that “Since the 1980s, the Toronto Zoo along with several other zoological parks, as well as government and non-government organizations in North America, have been working together to recover the black-footed ferret population” and that “since 1993 the Toronto Zoo, the only Canadian facility to breed this species, has successfully produced hundreds of kits, more than half of which have been reintroduced into the

⁵ Barry Graham is a pseudonym.
wild.” The participants also referenced the Toronto Zoo website (2015), which contains detailed information on these and other conservation programs affiliated with the zoo.

**Concerns about public perception of zoos.** Although staff views related predominately to the benefits of zoos, analysis revealed that they also expressed concerns relating to poor public perception of zoos. The zoo staff expressed a need to justify the captivity of animals in zoos for the purpose of conservation and/or education, and did not want to be perceived by the public as simply menageries or places for entertainment. Some of the zoo staff also expressed concern that zoos need to better educate people about zoos and their missions, and in particular about the role of zoos in biodiversity conservation.

A zoo staff member named Bridgette shared these views during her interview, commenting that: “the more that can be done to market the conservation aspect of zoos the better. The general public often believes we are just here to show the animals.” Other related comments from Bridgette’s interview included:

We have a conservation program for each area, so that if a visitor only came to see one aspect of the zoo, they would be hit with a conservation message from that collection. And any new development, it’s a focal point. It’s not simply just putting animals on exhibit.

In order to encourage the public to come, I think there has to be a strong education component, because people don’t want to see animals behind bars, just for fun and frolic, and it’s not ethical. But if we can enlighten them and move forward in a positive way for the environment, I think that’s a really good goal for us.

I think just to self-promote that we have to incorporate more into our own marketing campaign. I know they have done a different type of, I am picking up all the lingo, but it’s called ‘branding’ and in the last couple of years, with a new marketing manager, they have really tried to get our profile out there and I think we are recognized as one of the major attractions in the city. Ok, so we have opened that door, now let’s get in there with, there’s more to—the focus is fun, and that’s fine because if that brings the people out, that’s terrific. However, now they realize, that is a fun day out at the zoo. Let’s also now begin with the “B” message, oh, do you know what we do and maybe have one of us writing articles for the local newspaper or constant radio interviews showing the science and the conservation going on. To begin to think instead of thinking of University of Toronto as where the research is, well yeah, the zoo’s got something going on too. And I think that’s something marketing probably could grasp. I don’t know if we have brought that to their attention. I know in the last couple of years, fun was base one.
And I still don’t think the general perception with the public is that zoos have a conservation mission. We still have a long way to go. I think we are still viewed very negatively. And that’s a fault of ours, myself included, needing to get that message out to the public. Maybe a little less of a musical band on a July afternoon and a little more come out and see what we are doing at the zoo for tree growing in Trenton, Ontario. They don’t know we are funding programs down there for the Trent River system and all of these other things. And people are quite fascinated when they actually come into contact with staff when we are out giving presentations. They say I didn’t know the zoo did this. I haven’t personally even made a concerted effort to get that message out. They think we are only here to open up every morning to show you the animals. (Bridgette, Interview)

Similar views on zoos were also shared by other zoo staff members during their interview sessions, including by Russell who commented that, “the animals that we have here [at the zoo] are here to educate the public about their conservation,” and that the zoo staff “try to show what we do at zoos and sometimes we have negative publicity to believe that we are just there to show animals, that we are not conservation oriented” (Russell, Interview). Other zoo staff members shared similar views, including:

Well I think that zoos are becoming more sophisticated in a way that we no longer want to be seen as just sort of an entertainment facility or just having this menagerie of animals. We go above and beyond, using our collections to teach people about conservation, but not solely about conservation, there are other aspects that we can get across in zoos and I think that that seems to be a general trend. (Diana, Interview)

I would say that prior to coming to the Toronto Zoo I had a very philosophical issue with zoos in general. And I think that was unfounded. But it was founded on where zoos had come from in the first place, by capturing and exhibiting animals that may or may not be requiring any conservation at all, so I had a view of this in my mind. I would say over the last five to ten years, zoos have taken a huge move forward towards educating the public that the zoo is not simply for exhibiting animals, but exhibiting animals who are in danger in the wild and require some form of ex-situ conservation method, whether it be captive breeding or reintroductions or simply outreach, showing people through signage and the animals themselves. (Curtis, Interview)

I think the zoo is doing a good job now with posting signage around the site of the conservation programs that are happening and stuff in the various pavilions. You look at the black-footed ferret and then there’s the text there about the black-footed ferret breeding program and the release into the wild. And all the other signs onsite for amphibians and reptiles, snakes over-wintering, and break for snakes, and that stuff. It’s increasing even more, getting out there to help people I guess to make it more a forefront thing so they see how important zoos are and hopefully see their role in it. I guess just
kind of continue on with that sort of stuff and make it in forefront of people’s minds. And I think there needs to be a positive spin on it. Certainly not saying this species is in trouble for this reason. I think it needs to be, look how cool this species is and do you know that the zoo has got this program going on to ensure their survival? (Gwen, Interview)

These examples support the finding that the zoo staff hold concerns about poor public perception of zoos, and that they advocate for better educating the public about zoos. The zoo staff expressed a desire to promote a more sophisticated image of professionally managed zoos to the public, particularly in regards to their role in biodiversity conservation.

Chapter Summary

Three narrative vignettes were shared in the first part of this chapter, “Food for Thought,” “Behind the Scenes,” and “Petitioning for Better Zoos.” The vignettes provide rich detailed context for the study and highlight the major themes related to perspectives on zoos held by the participants.

The major thematic findings for this chapter relate to: 1) student and teacher perspectives on zoos; 2) evolving student perspectives; and 3) zoo staff perspectives on zoos. In the first subsection it was reported that the majority of the students and the teacher held mixed views on zoos. Mixed views were defined as concurrently held views for and against zoos, or views in support of zoos that were limited or conditional upon certain stipulations. One notable exception was the firm against-zoos stance maintained by a student named Jacob. Three significant themes emerged relating to the students’ and teacher’s views in support of zoos: (a) zoos provide enjoyment for people; (b) zoos educate and inspire people; and (c) zoos can be beneficial to animals by helping or protecting them. Three significant themes relating to the students’ and teacher’s views against zoos also emerged, focusing on participants’ concerns about: (a) the captivity of wild animals in zoos (i.e., confinement in unnatural habitats); (b) standards of care
for zoo animals, particularly in perceived substandard or poorly managed zoos; and (c) the use of zoo animals for entertainment purposes.

In the second section of findings, it was reported that the students’ views on zoos evolved over the course of this study. These changes were characterized by shifts in: a) emphases for or against zoos; and b) conceptualizations of zoos (i.e., seeing zoos a heterogeneous community and/or as centres for biodiversity conservation).

In the third and final findings subsection it was reported, unsurprisingly, that the zoo staff held views in support of zoos. They held the views that zoos are beneficial because they: (a) provide enjoyment for people; (b) educate and inspire people; and (c) contribute to research and biodiversity conservation. These views align with the main mission objectives of modern zoos (i.e., education, entertainment, conservation, research). Another more notable finding was that the zoo staff held concerns about negative public perception, and that they would like to see a shift in public perception on the roles of zoos (i.e., from simply places for entertainment, to centres for recreation, research, education, and conservation).
CHAPTER FIVE:
PARTICIPANT RESPONSES TO MULTIPLE PERSPECTIVES

The previous chapter helped establish that the teacher and the majority of the students held mixed views (i.e., concurrently for and against zoos), with the exception of one student who consistently held an against-zoos stance. It was also found that the zoo staff held a for-zoos stance. These findings confirm the assumption that participants in this study hold multiple views on zoos, similar to those found in the literature (see Figure H1 in Appendix H).

Few studies have explored how multiple perspectives on zoos play out in teaching and learning experiences in and about the zoo, which is surprising given the complex and sometimes controversial nature of zoos in society (AZA, 2004; Bertram, 2004; Fernandez, Tamborski, Pickens, & Timberlake, 2009; Hancocks, 2012; Hyson, 2004; Lindburg, 1999; WSPA & Zoocheck Canada., n.d.). Greaves, Stanisstreet, Boyes, and Williams (1993) found that students held concerns and objections relating to zoos, and implied that these views may detract from the educational benefits of these institutions, further suggesting that teachers be aware of this potential issue.

In light of this literature, I wondered what role (if any) the views against zoos held by participants might play in teaching and learning experiences in this study. Additionally, I wondered what strategies and positioning the educators (teacher and zoo staff) might employ when responding to multiple perspectives on zoos. These queries are explored in Chapter Five, thus addressing the second major research question of this study.

The chapter begins with three narrative vignettes focusing on how the students, teacher, and zoo staff respond to multiple views on zoos in teaching and learning situations within the classroom and at the zoo. The major thematic findings are then presented in three subsections,

Vignettes about Participant Responses to Multiple Perspectives

Following the narrative analysis process described by Polkinghorne (1995), three vignettes were constructed around the teacher’s, students’, and zoo staff’s responses to multiple perspectives in the classroom and at the zoo. Vignette 4 is set in the classroom during a teacher-directed lesson in which the teacher aims to provide the students with alternative ways of thinking about zoos. A significant purpose of this lesson was to address what the teacher considered to be misperceptions (or naïve and/or limited conceptions) of zoos commonly held by the students. The teacher’s open and direct approach to sharing his opinions on zoos are highlighted in this exchange, and some of the students reflect on this lesson.

Vignette 5 depicts a two-part lesson in the science classroom. In the first part, the teacher encourages the students to share their views on issues related to zoos and conservation with each other in small groups. In the second half of the lesson the students continue work on their action projects in their chosen groups. In these scenarios, the students’ and teacher’s responses to multiple perspectives in the classroom are depicted.

Vignette 6 takes place at the zoo, highlighting a presentation on zoos and biodiversity conservation delivered by the zoo staff. The approach to sharing positive aspects of zoos and limitations by the staff is depicted, and is reflected on by the teacher and some of the students. In these scenarios my role as participant observer continued. I recorded observations in field notes, and actively participated in lessons and activities with the teacher, zoo staff, and students.

Vignette 4: Let’s Talk about Zoos

*After greeting the students, Logan began the class with an introduction to his presentation entitled Zoos and Misperceptions. The students appeared to be interested in the topic, and were paying close attention. Logan had debriefed me on this presentation*
in advance, stating that he felt it was important to provide the students with alternative ways of thinking about zoos, as he believed that often students’ conceptions of (or objections to) zoos were naïve or limited in nature. He wanted the students to be educated about alternative interpretations of phenomena observed in zoos, and to become more aware of the role of zoos, especially with regards to conservation. He felt that this lesson would help to educate the students in this way. The teacher also felt that the upcoming zoo trip would help the students to learn more about zoos, by providing them with firsthand information about zoos though reading zoo signs and interacting with the zoo staff.

In the first slide, Logan shared, “Misperception#1: Zoo animals spend lots of time sleeping. They must be bored.” This was followed by a slide challenging the students to ask themselves, “What’s really going on?” Logan asked the students to consider some alternative explanations for why visitors see zoo animals sleeping or in an inactive state at the zoo.

“Many animals are nocturnal or most active in the early morning and late evening. This is due to each species individual circadian rhythm or “internal clock.” When we visit zoos in the brightest hottest parts of day most animals are normally not active, and this is especially true of large predators,” explained Logan.

Logan proceeded to show several more slides, explaining that “most animals are only active to hunt, eat and reproduce. If they do not need to hunt, they have little reason to be awake. They sleep or rest to conserve their normally very scarce energy sources. Predators sleep more than prey, because they can—they need not worry about being eaten while sleeping. Notice that most of the grazing animals – like giraffes, and deer-like animals were not asleep. Large cats (lions for example) have one of the longest normal sleep periods—about twice that of you AND they are most active in the evening when we are not there.”

Further, Logan stated that “A good zoo provides opportunities and spaces for animals to sleep. Animals in a zoo do not know they are supposed to entertain you. They are doing what they ‘choose’ to do, and they would gladly do more sleeping in the wild if they were able to. Television shows depict predators like lions hunting. This is because it makes for good TV. Watching 16 hours in a row of a lion sleeping would be boring for most people! In reality, in the wild, hunting takes up a small part of a predator’s time.”

Logan paused and waited for any of the students to respond. When no one did, he then presented the next slide, “Misperception#2: The animals are so skinny they must be starving.”

“Mr. Bennett, I agree. The animals must be starving because they are so skinny! We feed my dog whenever she is hungry. Zoo keepers should be feeding the animals more often!” exclaimed Jackie.

Logan paused for a moment and then continued with a slide showing images of overweight cartoon animals, cats and dogs, and farm animals. He then stated, “Think about it for a moment—what do animals look like in the wild? Often we think about our needs as humans, or what we perceive to be the needs of our domesticated pets, and then we transfer that thinking to zoo animals. Many of the domesticated animals around us like our pets are in fact overweight. Even some of the cartoon animals we see in popular media are overweight. Wild animals might look skinny, but often they are muscular and healthy. In the wild a predator usually eats once a day, just enough to meet its basic survival needs. Professionally-managed zoos know this and try to mimic animals’
naturally-occurring behaviours and dietary requirements."

Jackie listened intently and commented on how she never thought about it that way before.

Next, Logan shared, “Misperception#3: The animals were dehydrated and did not have any water or enough water. And the water they did have was disgusting looking,” to which he asked the students to consider that “dehydration is a medical condition that can only be assessed through blood tests. Zoo veterinarians and animal technicians regularly monitor the animals’ health with blood, urine, and feces tests. And if you think of it, if these animals did not have enough water they would be dead. Green or gross looking water is only harmful if it contains enough bacteria that are disease causing. We drink clear chlorinated water. Almost every other life form on the planet does not. They don’t care one way or the other. And in fact, chlorinated water might do more harm than good for some of these animals.”

He then showed the class a slide depicting a grizzly bear drinking water from a plastic water bottle to reinforce this point. Several of the students laughed at the image.

Logan then presented, “Misperception#4: The animals did not have enough space.” Again, he challenged the students to consider alternate explanations and ask themselves, “What’s really going on?”

Logan then shared a slide depicting animals in small cages and stated that, “Yes, some zoos do have very little space for animals. Many zoos actually are quite inhumane, even outdated. And for reasons like this, when the WSPA (World Society for the Protection of Animals) conducted a survey of conditions in Ontario zoos only a few zoos passed.”

He then stated, “But a good zoo has enough space for natural behaviours. Animals need space in a zoo to exercise and do some of their normal “wild” activities. Usually smaller animals need less space since they are smaller. Large predators in the wild only need large spaces to find enough food. Grazing animals had enough space to graze on fresh grass and run. They were not confined to a small space and were not given “farm animal food” such as hay. Students often complain about walking a lot at zoos and how they can’t see the animals up close, but this is for the protection of the animals over catering to visitors.”

Logan paused for a moment, and then continued with, “All zoos and aquariums are different. The Toronto Zoo is not the same as AquaWorld; the latter is more for entertainment. For example, you can feed the bears, deer, and some other animals at AquaWorld, so the amount of food that these animals get is not the same every day. It is done this way because it is entertaining for visitors to feed the animals. At the Toronto Zoo the staff monitors what the animals eat.”

Ian raised his hand and then asked, “How did AquaWorld do on that test you were talking about earlier?”

Logan responded by saying, “I am not sure, but I want you to know that I don’t have anything personal against AquaWorld. And it is not my job to tell you what’s right or wrong. It’s your decision!"

Jillian later revealed in her interview that despite holding concerns about zoos, she was keen to learn more about them. Logan’s views in this lesson sparked her interest in learning more about standards and practices in zoos.
Vignette 4: Summary

In the preceding story “Let’s Talk about Zoos,” Logan and his class are engaged in a teacher-directed, classroom-based lesson focusing on what the teacher believed to be commonly held naïve or limited perceptions of zoos. As he addressed these perceptions, the teacher encouraged the students to consider alternative ways of thinking about phenomena observed in zoos, often basing this on logical reasoning or current scientific theories (e.g., relating to animal biology and behaviour). At one point in the lesson, Logan shared that he wanted the students to form their own opinions about zoos and in so doing, decide for themselves what they thought was right or wrong about zoos. He explicitly stated that it was not his place to decide this for them. A student named Jillian reflected that Logan’s approach of exposing the students to alternative ways of thinking about zoos, as well as encouraging discussion around variable standards of practice in zoos, motivated her to want to learn more about zoos.

Vignette 5: Negotiating Multiple Views

Logan began by explaining that they would be spending the first half of the class working on a group discussion activity called a “Dilemma Card Activity,” and that the second half of the class would be spent working on their action projects. “We have lots of ground to cover today. Ok, first on to dilemma cards, please get into five groups, go!” Logan stated.

Once the students had assembled into groups, he handed out the activity and gave a brief description of the task at hand. The students were given ten cards, each with a specific dilemma, along with possible solutions. The students were asked to first individually choose from the possible outcomes provided; from there they were asked to talk about it in their groups and share their ideas. After each group member shared a view, the group was asked to see if they could reach consensus on which option they felt was the best overall. If they could not agree on one option they were told that this was ok too.

Logan and I had co-created this activity for the purpose of encouraging the students to openly share and negotiate their views on various zoo and conservation-related topics, and Logan clearly communicated this to his students when he introduced the activity: “The purpose of this activity is to explain why you disagree or agree. The idea is to bring about dialogue.”

The students worked in their small groups while Logan and I circulated around to each group, listening to student dialogue and occasionally participating in their discussions. Some of the students held similar views and did not have too much
discussion within the group, whereas other student groups discussed differing views with one another and tried to negotiate a consensus within the group.

I observed one group comprised of Jillian, Tessa, and Ian engage in discussion over the following Dilemma Card.

**Dilemma Card 2: Wood Bison**

You are head of a task force created to select the best course of action to attempt to preserve the Wood Bison. Members of your task force would like you to authorize capturing some of the Wood Bison and sending them to zoos to try to propagate them in captivity. Should you:

1. leave all of them in their natural environment;
2. capture some of them for zoos;
3. launch an education campaign about causes of endangerment of the Wood Bison; or
4. other (explain).

All three students believed that Option 3 (launch an education campaign) would be the best course of action in this situation.

Ian elaborated on this view by saying, “I see education as being critical to conservation.”

Tessa and Jillian agreed with him, and Jillian added, “If you put some of them in zoos, the others will be killed and the population will still be endangered. I agree that education is the best choice in this situation.”

I lingered with this group for a few more minutes, and they continued to share opinions and ideas in a respectful manner. In most discussions they were in agreement with one another.

Next, I observed another group comprised of Jacob, Ben, and Isaiah who had difficulty agreeing on one solution to the following scenario. After a few minutes they respectfully decided that they each had their own preference and that a consensus could not be reached.

**Dilemma Card 3: Lions**

You are the chief warden of a national wildlife reserve in Kenya. Lions, whose numbers in the wild are declining rapidly, are becoming pests for local ranchers. While the ranchers are trying to make a living by raising livestock, the lions are roaming beyond the borders of the reserve to hunt these livestock. This conflict has led to the killing of lions through the use of guns and poisons, in order to protect the ranchers’ homes and livestock. Should you:

1. encourage local ranchers to continue killing lions as needed;
2. try to prevent future conflict by increasing the time spent monitoring lions by your current game reserve staff;
3. accept support from a large American zoo, willing to provide additional staff, researchers, and equipment to help find a solution; or
4. other (explain).

The students were engaged in this activity in their small groups until Logan indicated that it was time to work on their action projects.
'As you all know, your action projects are due next Thursday and we will start presentations on Friday. There are a few things that I would like to clarify. First, you have your basic project, for example a book or a brochure, and that is what is due next Thursday. On Friday you are going to share your different ideas—kind of like a show-and-tell—not really a formal presentation. Now remember, this presentation does not fulfill the action component of the assignment because presenting to this class does not count as action. You have to ask yourself, now that you have done this project work how are you going to affect people outside of this class? So for example, your group might want to go into a Grade 7 or 8 class and share your topic, but also remember that your topic needs to be appropriate for the grade level that you choose. For example some of you may not want to share your topic with say a Kindergarten class. Or as a group you might decide to take your project back to the Toronto Zoo, or ask if you can gather and return old cell phones for recycling in the zoo’s recycling program. Another idea for your action component is to write a political letter or design a website. If you are designing a website, think about how you might promote it and who your target audience will be. Maybe some of you will want to take your project to the next level by creating awareness about your issue in the school, like through posters or over the school PA system. The action piece is probably the most important part of this assignment, and I want you to choose wisely. Remember, the action component is not due next Thursday, you will have more time for it, but you can start the leg work and let us know on Friday what you have done and we can help guide you on the action part from there,” explained Logan.

“So you want us to get out of the classroom?” asked Lily.

“Ideally, yes. I know this is new to you because usually you complete a project and there is no next step. This is meant to go beyond that. You chose your topic because it is important to you for some reason. That is why I didn’t tell you what to do. Ultimately, you are citizens of society and you impact what is done. So I ask again, how are you going to effect change? This is really the goal of a good citizen,” responded Logan.

“So we present to you first and then we can go to another class?” asked Lily.

“Yes. Sounds good?” responded Logan.

“Yes,” Lily agreed, and other students nodded in agreement as well.

“Now I’m going to give you some time to work in your groups so that you can brainstorm topics for the action project. Mrs. Winslow and I are going to walk around the classroom and visit with each group. We want to hear some of your ideas and we can answer any questions that you might have about the project,” announced Logan. For the remainder of the period the students worked in their self-chosen groups. Some groups were more focused on the task at hand than others.

Near the end of class, Logan approached a group of three boys comprised of Charlie, Roberto, and Jacob, who appeared to be arguing about their project.

Logan would later reveal to me that Jacob had written “I hate zoos” in his notes and that the boys were having difficulty deciding on an action component for their project on tiger conservation, due to their differing opinions on zoos. Logan believed that Jacob had written this statement out of frustration. Charlie and Roberto liked zoos and felt that they were worthwhile and should be the main focus of their project, whereas Jacob held concerns and objections relating to zoos and did not agree with this direction for their project. Logan had suggested to the group that they consider a compromise, such as focusing on building awareness or raising funds for an
organization involved in tiger conservation such as the World Wildlife Fund (WWF), rather than focusing on a zoo.

The following week, Charlie, Roberto, and Jacob shared a PowerPoint presentation on “Tiger Conservation” with the class. In this presentation it was revealed that they had chosen to compromise on their preferences. Charlie and Roberto, who held views in support of zoos, shared information related to the role of the Toronto Zoo in tiger conservation. Jacob, who held views against zoos, shared information related to the role of WWF in tiger conservation.

Once the boys finished speaking Logan complimented them on their presentation. He then asked them what specific action they had planned for their project.

“What action do you have planned? For example, will you be collecting donations for the Toronto Zoo or for WWF?” Logan asked.

“We haven’t decided, but we might present our PowerPoint to another class to raise awareness about tiger conservation,” replied Jacob.

“You’ve expressed an interest in protecting the natural environment, so you may want to slant it towards WWF rather than the zoo,” suggested Logan.

The boys gave non-committal shrugs, and sat down to indicate they were finished with their presentation.

Logan would later reflect that in this presentation you could clearly see two different opinions on zoos come through. He was surprised that the boys had anything to do with the Toronto Zoo in their presentation, after Jacob had expressed such strong opinions against zoos, and because Logan had suggested alternative solutions to the group.

In the end, the boys decided that for the action component of their project they would raise awareness about tiger conservation in the school. They participated in an interview conducted by peers that was shared with the entire student body through the school’s closed-circuit television network. In this televised interview, the boys once again spoke separately about efforts in tiger conservation made by the Toronto Zoo and the WWF.

Vignette 5: Summary

At the beginning of the vignette, “Negotiating Multiple Views,” the teacher encouraged the students to discuss their views on various issues related to zoos and biodiversity conservation with one another during a group activity. The students openly shared their views and were respectful of each other’s opinions. In the second half of the lesson, the students were given time to work on their action projects. A group of three boys with differing views on zoos had difficulty reaching consensus on the direction of their project, resulting in tension among group members and Jacob’s passionate response. The teacher offered support and alternative
solutions to the students and they eventually reached a compromise, which was to include everyone’s views into the project.

**Vignette 6: A Sharing Session**

By 10:00am, Logan and his class along with three other teachers and their classes from Trinity Secondary School were seated in a large room in the Toronto Zoo’s education building. The bus ride from the high school to the zoo had been relatively uneventful, and the students were now visibly excited to be at the zoo.

A zoo staff member named Russell was preparing to start a PowerPoint presentation entitled “Zoos and Conservation.” After a few minutes the lights were dimmed and Russell introduced himself to the group. He then began his presentation with a brief history on zoos, from ancient times to modern day. Russell stated that, “zoos just started off as a place for showing animals. They were just for people. Over the years, animals have become more and more important and today zoos are now centres for conservation.”

Russell’s then shared information on the Toronto Zoo’s vision “to inspire people to live in ways that promote the wellbeing of the natural world” and their commitment to the objectives of modern day zoos which included “recreation, research, conservation, and education.”

One of Russell’s slides was entitled “Behind the Scenes” and he described how the Toronto Zoo provided “veterinary care for more than 4,000 patients” and “over 400 different species” of animals. He explained that the zoo currently staffed “two full time zoo veterinarians and two zoo veterinary residents.” He also showed a picture of a mandrill named “Willy” who had “knee problems and was operated on by the same human doctor who treated Bobby Orr’s knees (famous defenseman for the Boston Bruins).” Many of the students responded with surprise at this revelation.

Next, Russell spoke about the Animal Nutrition Centre, stating that the Toronto Zoo is a leader in animal nutrition world-wide. He further shared that “wild diets are analyzed and replicated nutritionally with available foods” and that the zoo staff “feed everything from vampire bats which prefer cow’s blood, to elephants which eat 14 bales of hay per day, to reptiles which eat only once a month.” He let them know that later that day each class would have a behind-the-scenes tour of an animal holding area and the zoo’s animal nutrition centre.

On the whole, the students appeared to be quite interested in Russell’s presentation, and most were listening attentively, some even taking notes. Russell next shared with the students that the “World Zoo Conservation Strategy” is an initiative of the “The World Zoo Organization and the Captive Breeding Specialist Group (CBSG) of the Species Survival Commission of IUCN—The World Conservation Union,” which aims to organize and guide conservation work in zoos world-wide. He further shared that, “in North America this takes the form of Species Survival Plans (SSPs)” which aim to “maintain a particular species for 200 years.” It is believed that “90% of genetic material can be conserved with as few as 500 individuals in zoos” and that “only about half of these animals, at any given time, will be actively contributing to the breeding programs. The Toronto Zoo participates in over 35 SSPs. For example, we are part of the SSP for the western lowland gorilla. We have three founder animals not related to
any other gorillas in zoos and have had success breeding these animals in captivity.”

Russell explained that only some of the animals can be released into the wild. The Toronto Zoo has had some success in captive breeding and reintroducing populations of Puerto Rican crested toads, black-footed ferrets, and Vancouver Island marmots into the wild, and he elaborated on each of these conservation projects.

Russell ended his presentation by sharing that “zoos can provide appropriate captive habitats and good health for captive animals. They can also breed to sustain captive populations and breed for reintroduction. Zoos can do research on reproduction, veterinary care, animal behaviour and nutrition. And zoos can try to provide awareness and education for visitors—but this is only part of the solution. Of the 46,000 known vertebrate species alive now, zoos can maintain a maximum of 800 in viable captive populations—which is only about 1.7%. So let’s save habitats!”

Russell thanked the students for their attention and invited them to come up and ask him questions about the zoo or the presentation before exploring the zoo. A few students approached Russell, but the majority of the students left quickly to explore the zoo.

In a follow-up interview Russell would reveal to me that the zoo staff try to change attitudes towards zoos, by showing the public what zoos do. His view was that sometimes zoos experience negative publicity because people believe that zoos are just there to show animals, and that the public is not aware that zoos are conservation oriented. His zoos and conservation presentation was an example of how he tries to achieve this goal.

The teacher described Russell’s presentation at the zoo as a “sharing session,” and felt that he did a good job of talking to the level of the students. He thought that Russell effectively shared messages about what zoos are doing and didn’t take too much of a pro-zoos stance. Logan thought Russell was sensitive to the fact that the students may have held differing opinions on zoos, by the way that he shared some limitations of zoos.

Several students, including Charlie, Calvin, Ian, and Isaiah reported in their interviews that they found Russell’s presentation to be informative. Jillian’s response to Russell’s presentation was that it helped to reinforce for her that there are purposes to the Toronto Zoo other than looking at animals in cages, such as the zoo’s black-footed ferret breeding and reintroduction program.

Vignette 6: Summary

The preceding story “A Sharing Session” takes place at the zoo and highlights a zoo staff member’s approach to educating the students about zoos and their roles in biodiversity conservation. The teacher and some of the students reflected on this presentation, with the teacher remarking that it was a “sharing session” in which the zoo staff shared information on the zoo with the students, including some limitations of zoos, and did not promote a pro-zoos stance too strongly.
Findings: Exploring Participant Responses to Multiple Perspectives

The previous vignettes were constructed to provide a detailed context for the case, and to highlight findings related to the participants responses to multiple and sometimes conflicting perspectives in the classroom and at the zoo. Data analysis revealed that the responses made by the teacher were pedagogical in nature. The zoo staff’s responses were found to relate to pedagogy and their overall approach with the students and teacher. And lastly, the nature of the students’ responses relate to reflecting on teaching and learning experiences and their interactions with others.

Teacher: Pedagogy and Positioning

In exploring the teacher’s responses, three pedagogical approaches emerged as significant. The teacher felt that it was important to: (a) educate students about zoos; (b) expose students to alternative conceptions of zoos; and (c) encourage and model the sharing and negotiating of multiple views. The teacher’s positioning on zoos was often revealed to students through these responses.

Educate about zoos. A finding that emerged from this analysis was that the teacher responded to multiple views on zoos by educating the students about zoos. In other words, he provided the students with information about zoos and encouraged them to form their opinions based on facts, observations, and an overall deeper understanding of modern day zoos and their missions. He hoped to achieve this goal by educating the students about zoos through a variety of activities in the classroom and encouraged them to learn more about the zoo during the field trip. For example, in Vignette 1 Logan shared with his students that “one of the things I want you to find out on our trip is what the Toronto Zoo is doing outside of the zoo by reading exhibit signs and speaking with zoo staff” (Field Note #4).
Encouraging his students to learn about zoos regardless of whether they agree or disagree with them, was a recurring theme in Logan’s interview responses as well.

Something that I want them [students] to be aware of is the different conservation issues and to be aware of the roles that zoos have played. When you go to the zoo strictly for entertainment, and if you don’t know to read the signs, you don’t know all the things that the zoo is involved in, and you think the zoo is strictly there for an entertainment purpose. When you tell a student ahead of time to look for the different signs, they are quite amazed actually what’s there and things what they may not at first glance find entertaining, like for instance the wetlands they have there, then when they read the signs they realize the importance of that, and the fact that the zoo is involved in various aspects of conservation. (Logan, Interview #1)

One of the things that the students always say is, we see all those signs, but then why aren’t zoos doing more? And a lot of it is because of a lack of funding, but also students don’t even realize what actually is involved and the students perceive quite often the old idea of the zoo that it’s a caged animal but they don’t necessary realize how much effort is being done or even how those animals come into being at the zoo. Quite often, a lot of the zoo animals at the Toronto Zoo, in particular, have been rescued from other private zoos and so they kind of see that aspect there and see hopefully what’s behind the scenes, they talk about some of the reproductive technology they are using to actually produce them and have them survive in a different environment so they can be successful and still continue on. (Logan, Interview #1)

I want to see that the students are educated about the roles of the zoo and the fact that the zoo isn’t strictly a place for entertainment—it’s not the same thing as a pet store where they have animals in cages and you just look at them. I want them to see that the zoo is an area - one of the biggest areas - working towards conservation. I also want them to understand what role science plays in conservation and particularly the behind scenes aspect . . . and hopefully they will have the opportunity to ask staff what they are doing, as well as to learn the science of conservation, reproductive technology, and the fact that it’s been difficult in the past for zoos to have these animals reproduce in their non-native habitat . . . so that actually would be quite important for students to realize. (Logan, Interview #1)

I would have liked to see a little more information there at the rhino exhibit, maybe more sharing by the zoo keeper, because that would have been kind of nice for the students. That was I think a teaching opportunity that could have been good. But the students asked some good questions. They did seem to get involved and they also learned a lot about animal behaviour too, like marking its territory. It is good biology involved there. And also they asked good questions about the breeding of rhinos and the difficulties of it and they also saw a little bit of the risks I guess you can say in the decision making process and how the animals are cared for, whether they agree or disagree with it. (Logan, Interview#2)
And the students also had a chance to see what research was like at the zoo. So that was the most important aspect I think about the Zoo Diaries videos we showed in class. And they also saw the fact that the zoo keepers were emotionally attached and had an interest in what they were doing. And that was good too as well because if you have a perception of zoos being extremely cruel against animals, then you would picture that zoo keeper basically being the same kind of way, whereas in this case, you might still think actually that the zoos are not necessarily helpful for conservation, but then at least you would understand the fact that the people actually are trying, or the people actually don’t think that what they are doing is bad. (Logan, Interview #2)

In the sample quotations above, Logan discussed how he wanted his students to become more educated about: the role of zoos in conservation; zoo animal rescue; zoo animal reproductive biology and technology practices; zoo animal care practices; and zookeeper duties and responsibilities.

Expose students to alternative conceptions of zoos. Another pedagogical approach that the teacher used was to explicitly address what he considered to be naïve or limited conceptions of zoos by providing the students with alternative ways of thinking about zoos. This response was the focus of Vignette 4, which depicted the teacher sharing a presentation entitled Zoos and Misperceptions with the class. The teacher presented and asked the students to consider alternative explanations to numerous phenomena observed in zoos and how they relate to animal behaviours/needs in the wild. For example, Logan discussed why certain animals spend a lot of time sleeping or being inactive; and why some animals are in isolation or in groups (i.e., some animals are solitary in the wild and some are not), (Field Note #3). Logan reflected on this approach in his interview:

It was a pretty brief presentation overall, so it was a nice little introduction I think to zoos in general and I think it addresses some of the misperceptions of what students may think about zoos and especially, when they misinterpret human and animal behaviour, so I think it’s important there. So at least they are going into this with a realistic impression, because if you don’t address them, then basically when the students see the animals there just lying around, they automatically think it’s because they are bored because they are kept in a smaller environment what they naturally would be. So I think for that alone, at least that it makes them think twice about interpreting the behaviour. That is important to do. So hopefully they at least understand the fact that if you are going to disagree with
zoos or agree with zoos, at least base it on what they would actually see in nature as compared to see what they think would actually occur. That’s kind of like them knowing a little bit of science behind it or actual observations in the wild. (Logan, Interview #2)

**Model and encourage the sharing of multiple views.** Another teacher strategy was to model and encourage an open sharing of multiple views on zoos with the students, including his personal mixed views on zoos. Although Logan often discussed zoos in a positive light, as a place of learning and enjoyment for visitors, he also readily acknowledged his concerns about what he believed to be limitations of zoos. In class, Logan frequently spoke on topics such as zoo funding and budgets; zoo accreditations and governance; zoo affiliates and partners; as well as zoo animal enrichment and nutrition. He also spoke about zoo missions and initiatives, namely, research, education, entertainment, and conservation. In addition, Logan was cognizant of the many controversies and challenges faced by modern day zoos, such as issues surrounding the treatment of animals in captivity; differences between professionally-managed and poorly-managed or roadside zoos; and the need to balance animals’ and visitors’ needs (Logan, Field Notes #2 through #7; Interviews #1 and #2).

For example, Logan freely shared his views for and against zoos, particularly in relation to the heterogeneous nature of zoos, and in Vignettes 1 and 4 he used terms such as “good zoos” and “bad zoos” to describe this variance.

I think having the students look at different kinds of zoos, they understand the fact that there is a big range and you can’t classify all of them in the same category. (Logan, Interview #2)

Yes, in some places animals don’t have enough space. For reasons like this, only a few zoos in Ontario passed the basic requirements laid out in a survey done by the WSPA on the conditions in Ontario zoos . . . But a good zoo has enough space for natural behaviours. Students often complain about walking a lot at zoos and how they can’t see the animals up close, but this is for the protection of the animals over catering to visitors,” (Logan, Field Note #3).
Logan wanted the students to be aware of views for and against zoos: “when we were doing some of the activities, they would bring about some ideas about zoos and the negatives and positives” (Logan, Interview#2). For example, Logan wanted the students to learn more about the limitations of zoos in captive breeding and the reintroduction of animals into the wild, as exemplified in a reading assignment entitled “Zoos and Captive Breeding”:

**The Role of Zoos and Other Institutions**
Zoos, aquaria, marine parks, insect houses, botanical gardens—all have their role to play in captive breeding of plants and animals, be it by actually conducting captive breeding or providing expertise and help. It is estimated that there are about 500,000 animals in captivity in zoos throughout the world. However, it is widely believed that for best results, captive breeding must be done with minimum human contact.

Not many zoos possess the know-how for seriously managing captive populations, though that is a situation that is rapidly changing. With new technology, like molecular and DNA analysis, species management has become easier and helps scientists avoid potential pitfalls. For example, mapping genealogical information also helps minimizing inbreeding.

By estimation, if all zoos in the world were used for captive breeding, only a maximum of about 900 species of vertebrates could be kept alive in captivity. But over 2,000 such species are facing extinction and captive propagation would seem to be the only way out.

**Problems with Captive Breeding**
The downside with breeding in captivity is that it has a notoriously low success rate. It has been found that less than 10 per cent of mammalian species are self-sustaining in captivity. Statistics with reptiles show a similar trend.

A number of threatened species like the giant panda, penguin, killer whales and elephants have proved very difficult to be bred in captivity. And many zoos may be accused of using the method for purely commercial reasons.

Helping animals breed in captivity is but a single step to ensuring conservation of species for the future of our planet. The ultimate aim is to be able to reintroduce future generations into their natural habitat.

That said, it must be noted that captive breeding, not being a natural process, does not allow for natural selection. Which means animals used for captive breeding may not be the strongest or best of their species, and this could cause a problem when they are reintroduced into their habitats. (World Wildlife Fund, 2015)
In addition to sharing his own mixed views on zoos, Logan clearly stated that he wanted the students to form their own views on zoos. This was depicted in Vignette 4 when Logan stated to his students:

The Toronto Zoo is not AquaWorld; the latter is much more for entertainment. You can feed the bears and other animals like deer . . . I don’t have anything personal against AquaWorld. It’s not my job to tell you what’s right or wrong. It’s your decision.” (Logan, Field Note #3).

Logan also encouraged the students to share their differing opinions in class, including concerns and objections relating to zoos. For example, in Vignette 3, three students working on an action project aimed at promoting better regulations for zoos in Ontario freely shared their concerns about what they perceived to be substandard (or roadside) zoos with their class and with two other classes at Trinity Secondary School. Another time when Logan encouraged the students to share multiple views on zoos is depicted in Vignette 5, when he clearly stated to the students: “Explain why you disagree or agree. The idea is to bring about dialogue” during the “Dilemma Card Activity” (Logan, Field Note #8). This activity was co-created by Logan and me, for the purpose of encouraging the students to openly share and negotiate their views on various zoo and conservation related topics. Specifically, the objectives of the task were:

- To allow students to become more knowledgeable about current conservation issues from a variety of perspectives
- To provide a chance for students to think critically, examine their own values and beliefs, and formulate their own opinions
- To encourage the sharing of opinions, thoughts, and ideas through dialogue in small groups and in whole class discussions

These objectives aimed to promote a safe learning environment in which the students were encouraged to openly share and negotiate multiple views on zoos.
Although different from his own views, Logan was understanding and respectful of Jacob’s against-zoos stance and he made mention of this in our interview sessions and meetings (Logan, Meeting; Logan, Interview #2). In Vignette 5, Logan directly addressed Jacob’s concern about doing his project on zoos, and suggested that he focus on raising awareness about protecting the tiger’s natural environment through promoting an organization like WWF: “You’ve expressed a view on protecting the natural environment, so you may want to slant it towards WWF rather than the zoo,” (Logan, Field Note #12). Logan encouraged Jacob and his two partners to compromise on their tiger action project so that all group members’ views on zoos could be respected (Logan, Meeting).

During an interview, when asked if he felt that views for and against zoos were fairly represented to the students, Logan summarized his approach and that of the zoo staff in this unit of study as follows:

I think so. I think we definitely did the positive, but we also accept the negative as well. I think actually with Jacob’s opinions, I mean, the fact that in the end basically him saying that he still doesn’t like zoos and that’s important to still feel comfortable enough to say that . . . And we had one group do a presentation on that alone, basically not all the zoos are the same and there should be some regulations. So I think that’s significant too. And so definitely, that group presented some of the negative aspects of zoos. And also the Toronto Zoo also recognizes their failures too. I mean they could easily have just concentrated strictly on success, but they said we are not doing this well, or, we are only a small part of the picture. I think that was important to do. We definitely took the pro-zoo side because that’s kind of what we are looking at—the role of zoos but then we definitely also looked at some of the other aspects of zoos too. (Logan, Interview #2)

The teacher felt that although there was an implicit pro-zoos approach to the unit, aspects of the against-zoos stance such as their limitations were also shared. Logan also pointed out that the students felt comfortable expressing concerns and objections in class, such as when a student group shared their views on roadside zoos in Vignette 3.
Zoo Staff: Pedagogy and Positioning

Data analysis revealed two main themes relating to the nature of the zoo staff responses to multiple views on zoos: (a) educate about zoos; and (b) create a sharing session. Furthermore, by creating a sharing session, the zoo staff positioned themselves on zoos for the students and the teacher.

**Educate about zoos.** As depicted in Vignette 6, a zoo staff member named Russell delivered a presentation on the topic of zoos and conservation to Logan and his students during their field trip to the zoo. Russell aimed to educate the students about zoos and their role in conservation, and cited specific examples in his presentation.

> I think we do try to change attitudes a little bit with that. We try to show what we do at zoos and sometimes we have negative publicity to believe that we are just there to show animals, that we are not conservation oriented . . . and I would hope that they would leave knowing that the zoo does a lot of things that people don’t know about. (Russell, Interview)

Changing attitudes toward zoos by educating people about zoos was a theme that came out in other zoo staff responses as well. This finding overlaps with a finding cited in Chapter Four, where some zoo staff expressed concern over public perception of zoos and expressed a desire to better educate the public about the role of modern day zoos in conservation, research, and education in order to change simple and sometimes negative perceptions of zoos as simple menageries.

**Create a sharing session.** The zoo staff’s positioning on zoos during the Zoos and Conservation presentation was described by the classroom teacher as a “sharing session.” Logan stated that rather than taking a pro-zoos stance, Russell took a “here’s what we are doing at the zoo” approach to his presentation.

> Well I think actually he did a good job of talking to the level of the students. So I think the presentation was quite good. And I think the fact they knew a little bit about it beforehand was kind of helpful. And I think he brought them a good message too as
well, the fact that this is what the zoos are doing and didn’t take too much of a pro-zoos
stance . . . understanding the fact that students may have different opinions . . . just tried
to share some different things. So it was more of a sharing session, which was quite
effective. (Logan, Interview #2)

In Vignette 6, Russell shared his view that modern day “zoos are now conservation
centres” during one of his introductory slides (Russell, Field Note #5) and at the same time
acknowledged that zoos still face challenges and experience failures with regards to initiatives
like animal reintroductions. For example, Russell spoke specifically about the Toronto Zoo’s
challenges and successes relating to reintroducing populations of the Puerto Rican crested toad
into the wild (see slides below). He also acknowledged that zoos are limited in that they are
really only able to help a very small number of endangered or threatened animals in the world,
stating “of the 46,000 known vertebrate species alive now, zoos can maintain a maximum of 800
in viable captive populations—which is only about 1.7%” (Russell, Field Note #7; Zoos and
Conservation Presentation).

<table>
<thead>
<tr>
<th>Puerto Rican Crested Toad</th>
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</thead>
<tbody>
<tr>
<td>-One of our most successful research projects, is the Puerto Rican Crested Toad</td>
</tr>
<tr>
<td>-Reduced to one breeding site (a puddle in a parking lot) that was under threat of development</td>
</tr>
<tr>
<td>-Decreasing numbers due to habitat destruction and introduction of invasive species</td>
</tr>
<tr>
<td>-The ecology of a species must be understood before zoos can proceed with effective conservation</td>
</tr>
<tr>
<td>-But how do you follow a toad in the wild to discover how it lives?</td>
</tr>
</tbody>
</table>
- Biologists usually attach a radio transmitter to the animal and then follow its movements with a radio receiver and a directional antenna.
- But how do you attach a transmitter to a toad?
- All of the Toronto Zoo designs for attaching a radio transmitter to a toad either hurt the toad or came off quickly until...

- ...we sought the help of 2 young women, bathing suit designers from Queen St. W. in Toronto and they soon came up with elegant swim wear for the Puerto Rican crested toad that allowed us to track them for 3 weeks and discover a great deal about their ecology.

- Captive toads are allowed to aestivate (cool, dormant period)
- After several months of dormancy they are ready to breed
- Thousands of eggs are produced and most survive

- At 2 cm toadlets can be returned to the wild
- 1000s of toadlets are now released each spring

(Russell; Zoo and Conservation PowerPoint Presentation)
I now turn to an examination of the students’ reflections on teaching and learning and their interactions with other participants, as they relate to multiple views on zoos in the classroom and at the zoo. Findings reveal three significant themes in these responses: (a) balance and impact of pedagogy; (b) respect and tension in student interactions; and (c) impact of views against zoos on learning.

**Balance and impact of pedagogy.** The students noticed and reflected on the teacher’s positioning on zoos in the unit. Some of the students reflected on this when asked during an interview, “Do you feel that both the positive and negative sides of zoos were discussed in our unit of study at school?” The students shared that although both aspects for and against zoos were covered, they felt that the educators placed greater emphasis on the positive. Furthermore, students shared that they would have preferred a more balanced approach from educators. Some sample responses were, “Yes, probably more positive though, because they are trying to enforce that zoos are good . . . Just more focused on positive than negative” (Ben, Interview #2); “I would have liked to know more about the negatives. I think we focused more on the positive than the negative” (Isaiah, Interview #2); “I think it was just more based on the positive. We didn’t talk a lot about negatives” (Bobby, Interview #2); and “Yes, we talked about both. We heard other people’s opinions of both the negative sides and positive too” (Liam, Interview #1). Lily similarly responded with:

I think so. Because we looked upon the fact that there are a lot of zoos that don’t take care of their animals and yeah I think we looked upon the good and the bad and also the misconceptions. Those were good too because I think a lot of people do have misconceptions on zoos. They are sad because they are always sleeping, stuff like that. So we looked at everything I think. (Lily, Interview #2)
The students also reflected on the zoo staff’s approach in the Zoos and Conservation presentation stating that they liked it; it was informative; and the zoo staff shared not only what zoos do, but some limitations as well:

I just liked how we talked about the conservation of the animals and it gave me a good sense of knowing what they do there, what their objective is. (Isaiah, Interview #2)

I thought it was very knowledgeable. It just showed their main focus, what the purpose of the zoo is—Yeah, I thought it was very informative. (Ian, Interview #2)

Because he told us about what zoos do and also told us what zoos can’t do. They only help a certain small percent [of species]. I think there’s a big percent that zoos could not help. (Roberto, Interview #2)

Another notable finding was that students felt that exposure to multiple views affected the way they formed their own views on zoos. In some cases, this occurred as a result of specific lessons or activities, for instance, Jillian commented on the impact the *Zoo Diaries* video had on her view on zoos:

I have never heard anything on the black-footed ferret before, so it taught me a good deal. Especially since it’s the Toronto Zoo you wouldn’t really expect the zoo to do something like that. You think zoos are only for entertainment. (Jillian, Interview #2)

Jillian also attributed changes in her views on zoos to “the final project and the zoo trip, as well as the behind-the-scenes tours and lectures at the zoo” (Jillian, Survey#2). Ian similarly attributed changes in his views on zoos to: studying biodiversity in class; visiting the zoo; completing a project; doing an action piece; and getting a behind-the-scenes tour of the zoo (Ian, Survey #2).

In Vignette 3 Jillian described herself as a “blank page” and shared that information provided by the teacher and zoo educators had an influence on how she formed her own perspectives on zoos.

That presentation that the guy, the behind-the-scenes tour, and everything helped me understand about why the zoos are positive . . . in conservation efforts and in taking care of the animals and the science of it. I was like a blank page before all of this. So
everything that we did affected it . . . I wasn’t really sure what the zoos were doing . . . I was not sure what they were about at all. (Jillian, Interview #2)

Just the fact that the Toronto Zoo, the whole behind the scenes thing, it was kind of the same kind of thing as the project that we did. It just kind of helped reinforce that there are other purposes to having the Toronto Zoo and what he did about the black-footed ferret and stuff like that and the way he described everything like with the Toronto Zoo behind the scenes kind of thing, it was really interesting. Because when you go, you look at animals in cages and then you leave and then this was actually something more. (Jillian, Interview #2)

The fact that the Toronto Zoo has a special lab to make sure that the animals are getting nutrients. That they are not just for entertainment purposes . . . that they have educated people that were specially trained to do this working there. (Jillian, Interview #2)

Logan’s views on zoo standards and roadside zoos seemed to have had an impact on some of his students. For example, Jillian shared how these views influenced her choice to pursue zoo standards for her group action project topic, as was depicted in Vignette 4.

[Mr. Bennett] mentioned something in class. He mentioned the words “zoo standards” . . . it came up and it was kind of interesting because the Toronto Zoo and Rossville Zoo are the only zoos I have ever been to and they are completely different. I wanted to know if there was anything to that. (Jillian, Interview #2)

The students also reflected on the impact of Logan’s Zoos and Misperceptions presentation on their developing views on zoos.

I myself held those misconceptions about zoos . . . So it probably was true to thinking, but sometimes you feel sorry for these animals and you don’t really need to. (Jillian, Interview #2)

I think we need stricter laws for the zoos. Because like I said I can even own a tiger, as long as I don’t abuse it or mistreat it . . . because I didn’t realize how many zoos are actually roadside zoos, aren’t treating the animals correctly and how they are supposed to be. (Jackie, Interview #2)

I learned it’s actually—like some of the things you grew up thinking, that a wild animal is too skinny and you think it’s not getting enough to eat, even though that’s actually how it’s supposed to be. And like dogs and cats are just getting overfed . . . Like you see—like the cheetah, this thin, you think something’s wrong. Meanwhile, it isn’t. (Jackie, Interview #2)
**Respect and tension in student interactions.** Findings revealed that the students most often shared their views openly with each other and were respectful of each other’s opinions. For example, in Vignette 5, students with differing opinions worked well together on the “Dilemma Card Activity,” where they were able to engage in dialogue and share differing views (Field Note #8). Also, in Vignette 3, Jillian, Tessa, and Jackie openly shared their concerns about regulations and standards of practice for roadside zoos in presentations delivered at the school. These views on zoos were generally received respectfully by their peer audiences.

Occasionally, however, tension over differing perspectives on zoos arose among the students in the classroom. This was illustrated in Vignette 3 when Jillian responded passionately to the students laughing at a video clip of distressed baboons at a roadside zoo. Jillian emphatically expressed displeasure at their reaction. Another example of tension arising among student interactions was depicted in Vignette 5. This vignette showed Jacob, Charlie, and Roberto in conflict over the direction of their action project on tiger conservation. Jacob expressed frustration toward group members over their clashing opinions on zoos and wrote “I hate zoos” in his notes (Logan, Field Note #12). The teacher later reflected on this situation during one of our meetings:

Yeah. I did tell him beforehand not to include zoos, but the other members in the group, they liked the zoo and they felt that zoos are worthwhile. So, that might have been the compromise as well. Because even before when we talked about zoos, the other boys said we will put this in our project and then he’ll go with it, and Jacob said no actually, I won’t. That’s when he wrote the comment, I hate zoos. It’s because actually in regards to what they had said . . . I think it was a strong statement, he was trying to make a point. (Logan, Meeting)

A compromise was eventually reached among group members, as they chose to build awareness around tiger conservation by including both the Toronto Zoo and WWF in their presentation, each of the boys delivering the sections of the presentation that pertained to their preferences. What follows are sample slides from the boys’ presentation, illustrating how this...
student group integrated two different opinions on zoos into their presentation. In the first slide, the two students who held a for-zoos stance presented information on the Toronto Zoo’s reproduction program for tigers. In the second slide, the student who held an against-zoos stance did not want to include information on the zoo in the presentation, and shared information on the WWF’s tiger conservation efforts around the world. In the third slide, the students presented information on how people can get involved with tiger conservation, which included supporting both the zoo and the WWF.
WWF & Other Organizations

WWF (World Wildlife Fund) is focusing in the conservation of tigers all over the world. The goal is to allow future generations to have access to tigers roaming in the wild. WWF efforts concentrate in 4 areas where Tiger protection is needed:

Get Involved!

- Adopt an animal. The animal will stay at the zoo, but you will go home knowing you are supporting the zoo.
- Become a member of a group/organization such as WWF. Support the conservation of wildlife.
- Donate! Help zoos and organizations keep up the work of saving our world.
- Volunteering. Volunteer and support conservation efforts.
- http://www.worldwildlife.org/
- involved/
- http://torontozoo.com/

(Roberto, Charlie, & Jacob; Tiger Conservation PowerPoint Presentation)
Logan reflected on this group’s presentation during his interview, commenting on how the two different views on zoos were apparent:

Well the interesting thing is in the presentation you can tell there are two different opinions - two different opinions come through in the presentation. I was actually surprised that they had anything to do with the Toronto Zoo in there. (Logan, Meeting#2)

**The impact of views against zoos on learning.** Findings suggest that the students holding views against zoos did not see these views as impacting their learning or their desire to learn in the unit. During interviews conducted after the unit of study, the students were specifically asked, “Do you feel that you have any negative views toward zoos that may have impacted your learning in this unit?” Several students simply replied no, such as Bobby, Isaiah, Liam, and Tessa. Tessa for instance, replied:

Although at first I had some negative feelings about zoos, I was interested in becoming more informed about them, so I was motivated to learn more about zoos in our unit. (Tessa, Interview #2)

Other students responded to this interview question by saying that they were open to learning at the Toronto Zoo, which they viewed as an acceptable zoo, but if the field trip had been to a zoo that they found to be unacceptable they would have taken issue with that. In other words, the heterogeneous nature of the zoo community factored into their acceptance of learning in a zoo environment, whereby zoos of a perceived high standard of practice were acceptable and those of a perceived low standard of practice were not.

No. It kind of pushed me toward learning more about zoos in general. I took more time to look at the stuff at the Toronto Zoo, because in contrast to roadside zoos—like the quality of them—it didn’t block me off. It kind of helped me. (Jillian, Interview #2)

Not really. Because we really focused on the Toronto Zoo and that was a fantastic zoo. (Jackie, Interview#2)

Not the Toronto Zoo, but probably—yeah —I probably would have had a problem with a roadside zoo. (Ian, Interview #1)
Jacob, a student with consistently strong views against zoos, responded that visiting the zoo was “informative,” “very good,” and that he “learned a lot” (Jacob, Interview #1). This was also noticed by the teacher who commented that the trip was enjoyable for all of the students, including Jacob (Logan, Interview #2). During Jacob’s interview, when asked if his views against zoos affected his learning experiences or motivation to learn in the unit, he replied: “Definitely not. I still listened to what was said and it’s good to learn more. It might even change your opinion” (Jacob, Interview #1). It is interesting that Jacob suggests that opinions might be changed through educating people about zoos, when he held firm to an against-zoos stance over the course of the study.

Chapter Summary

This chapter began with three narrative vignettes which helped to depict the context of the case for the reader and highlighted major themes relating to the responses of the students, teacher, and zoo staff to multiple views in the classroom and at the zoo. These narrative vignettes were entitled: “Let’s Talk about Zoos,” “Negotiating Multiple Views,” and “A Sharing Session.”

Findings on the participants’ responses to multiple perspectives were then presented, as they relate to the: 1) teacher’s pedagogy and positioning; 2) zoo staff’s pedagogy and positioning; and 3) students’ teaching and learning reflections and interactions. The teacher’s pedagogical approaches included: (a) educating students about zoos; (b) exposing students to alternative conceptions of zoos; and (c) encouraging and modeling the sharing and negotiating of multiple views. Through these approaches, the teacher revealed his own positioning (i.e., mixed views on zoos) to students. The zoo staff’s pedagogical approaches included: (a) educating about zoos; and (b) creating a sharing session. The sharing session contributed to how the zoo staff positioned themselves on zoos according to the teacher and students.
Analysis of the students’ reflections on teaching and learning and their interactions with each other revealed several key themes. First, the students noted that although both views for and against zoos were shared in the Zoos and Conserving Biodiversity unit of study, they felt that the educators positioned themselves more toward a pro-zoos stance. The students also reflected that exposure to multiple views through various teaching and learning activities affected the way they viewed zoos. Findings also suggest that the students shared their views on zoos openly and respectfully with each other, although occasionally tension did arise between the students because of differences in views. It was also found that the students who held concerns or objections relating to zoos did not feel that these views impacted their learning, or their motivation to learn in this unit. A notable exception was that some students expressed concern about having to learn in zoos of a perceived low standard of practice. In other words, the heterogeneous nature of the zoo community appeared to be a factor in the students’ willingness (or resistance) to learning in a zoo setting.
CHAPTER SIX: DISCUSSION OF FINDINGS

The discussion presented in this chapter seeks to interpret the findings presented in the previous two chapters, and in doing so addresses the two main research questions of the current study. In this way, Chapter Six aims to contribute to a deeper understanding of the participants’ perspectives and experiences related to teaching and learning about zoos during the unit of study on zoos and biodiversity conservation.

Discussion

The first half of the discussion interprets the findings on the participants’ perspectives on zoos, and connects these findings to the bigger picture of zoos in society. It is a response to a call in the literature for additional research on the nature of people’s views on zoos (AZA, 2004; Hancocks, 2012; Hyson, 2004) including in zoo-based teaching and learning contexts (Davidson, Passmore, & Anderson, 2009; Greaves, Stanisstreet, Boyes, & Williams 1993).

The second half of the discussion interprets the findings related to the participants’ teaching and learning responses to multiple perspectives on zoos, including the challenges facing educators in this study. It contributes to a limited area of research (Davidson et al., 2009; Greaves et al., 1993), and has the potential to benefit students, teachers, and zoo staff who engage in zoo-based education programs.

Interpreting Participant Perspectives on Zoos

The finding that the participants in this study held multiple views (mixed, for, and against zoos) extends and adds support for previous research which similarly found that multiple views (see Figure H1 in Appendix H) exist among the general visiting public (Finlay, James, & Maple, 1988; Reade & Waran, 1996; Tofield, Coll, Vyle, & Bolstad, 2003).
In addition, the three main themes found in the students’ and teacher’s views in support of zoos (i.e., zoos provide enjoyment; zoos educate and inspire people; and zoos can help and protect animals) generally overlap with, and build on what is currently understood about the views for zoos held by students (Greaves’ et al., 1993) and teachers (Tofield et al., 2003). The three main areas of concern in the students’ and teacher’s views against zoos (i.e., confinement of animals in captivity; using animals for entertainment purposes; and questionable standards of care for animals) also overlap and build on what has been found in previous research relating to concerns and objections about zoos held by students (Greaves et al., 1993; Tofield et al., 2003) and teachers (Tofield et al., 2003).

This study also extends the literature by exploring views held by the zoo staff. The finding that the zoo staff held a predominately for-zoos stance is similar to conclusions reached by Tofield et al. (2003) who found that a zoo curator at a professionally-managed zoo held predominately positive views on the zoo, other staff, and zoo animal welfare. My findings also suggest that the zoo staff held concerns about the public’s perception of zoos, and wanted to establish the zoo’s public image as one of a professionally-managed zoological park focusing on conservation. These findings align with literature from the zoo community which promotes modern zoos as conservation centres (Rabb, 2004; Rabb & Saunders, 2005; WAZA, 1993 and 2005).

The views held by the zoo staff and teacher were clearly more established and complex than those held by the students. No noticeable shift in the teacher’s or zoo staff members’ perspectives on zoos was observed over the course of the study. The teacher came to this research project with a formal educational background focusing on science education, including teaching and learning in informal learning sites such as zoos. He did not report having any new learning on zoos stemming from this research that affected his perspectives on zoos. The zoo
staff shared perspectives and experiences related to the research, but they were not asked to engage in any activities through this study that might have affected how they view zoos.

The students’ views, on the other hand, were observed to evolve over the course of the study. Jillian’s reflection on her changing views on zoos exemplifies this finding:

I feel differently about zoos and what they do to conserve wildlife, and I’m more educated towards roadside zoos and what can be done to stop them. I also learned about some of the various organizations that conserve wildlife and how I can help them. (Jillian, Survey #2)

Shifts in both the for- and against-zoos emphases of the students’ mixed views appeared to be linked to the students developing a deeper understanding of zoos and their complexities.

Changes in the students’ views were related to developing a better understanding of the heterogeneous nature of zoos. The students began to see variance within the zoo community in terms of practices and standards, as described by Fàbregas, Guillén-Salazar, and Garcés-Narro (2012) who highlight member differences in areas such as size of zoological collection, maintenance of grounds and facilities, and suitability of enclosures for animals.

Another aspect of the students’ views that evolved over the unit of study was developing an understanding of the roles of zoos in biodiversity conservation. Findings suggest that by the end of the unit the students were better able to identify conservation mission objectives and shared specific examples of zoo conservation initiatives and partnerships (e.g., black-footed ferret and Vancouver Island marmot captive breeding and reintroduction projects, the cell phone recycling project to help protect gorilla habitats).

Relating Participant Views to the Complex Nature of Zoos

Greaves et al. (1993) suggest that the ability to hold and appreciate both positive and negative aspects of zoos is indicative of a mature and balanced view, and further that these aspects are at times conflicting and held in a “moral tension” (p. 60). Close examination of the
participants’ views on zoos in this study support Greaves et al.’s interpretation, in that the teacher and the majority of students clearly held an appreciation for both the advantages and disadvantages of zoos, and at times these views were in tension—within and between participants.

Tensions within and between the views of participants are not surprising given the bigger picture—that the identity and roles of zoos are complex and often contradictory (see for example, Hancocks, 2012; Hyson, 2004; WSPA & Zoocheck Canada., n.d.). The goals of modern day zoos (i.e., animal welfare, education, conservation, research, and entertainment) are often conflicting (Fernandez, Tamborski, Pickens, & Timberlake, 2009; Hyson, 2004); and arguments “for” and “against” zoos are common in public forums ranging from academic research papers to popular media like books, television, radio, and the Internet (see for example, Bertram, 2004; Bowman, 2008; Chiszar, Murphy, and Illiff, 1990; Lindburg, 1999; Wickins-Drazilova, 2006). Quite often the focus of these tensions includes the relationship between people and zoos, and/or the rights and welfare of zoo animals, as was the case with the students and teacher in this study.

The participants’ views in this study also align with acknowledgement within the zoo community that “the rise of philosophically driven activism has profoundly altered the way society views these [human-animal] relationships” in zoos (Lindburg, 1999, p. 433); and reported trends that “fundamentalist belief systems are emerging that challenge the impact of our conservation messages (e.g., animal rights’ groups)”; “the public’s concern for animal welfare is increasing”; and “there is an increasing focus on accountability amongst the media, funders and the general public (i.e. fiscal responsibility, evaluation of impact)” (AZA, 2004, p. 4).

Findings suggest that the views on zoos held by the students, teacher, and zoo staff reflect the complex nature of zoos in society, and further, due to the nature of these views,
sensitive issues and controversial topics (AZA, 2004; Dearden, 1981; VanRooy, 2004) were brought into teaching and learning experiences. These issues and topics can be categorized into three main areas of concern: 1) justifying the existence of zoos; 2) balancing animal and visitor needs in zoos; and/or 3) establishing identity and roles of zoos in society. These categories are not mutually exclusive and certain concerns or issues expressed by participants fit within more than one category.

**Justifying the existence of zoos.** The participants in this study held differing and sometimes conflicting views on whether or not the captivity of wild animals in zoos could, or should, be justified for the sake of “the greater good” such as conservation and education objectives. Some of the participants held the view that the benefits stemming from education and conservation in zoos justified the captivity of wild animals in zoos under the right conditions and standards of care. A student, Jacob, consistently expressed strong disapproval about the captivity of wild animals in zoos, and did not see conservation or education objectives as justification for their existence. His view was sometimes held in direct opposition to the for-zoos views held by other students.

Dialogue on the justification for the existence of zoos among the participants in this study overlaps with the considerations “for” or “against” zoos found among the general public. Those who are against zoos hold concerns about the rights and/or welfare of zoo animals (see for example, Bowman, 2008; Hallman & Benbow, 2006; Lindburg, 1999; Malamud, 1998; Mullan and Marvin, 1999; Wickins-Drazilova, 2006). Specifically, those holding an against-zoos stance share similar concerns as the participants in this study relating to: animal health, longevity, reproduction, limitations on natural behaviours, freedom and choice, and dignity. Those who oppose zoos question “the legitimacy of holding any animals captive” (Lindburg, 1999, p. 440), critique the benefits of zoos proposed by the pro-zoos stance (i.e., research,
education, and conservation contributions), and argue that zoos promote human dominance over non-human animals and an unnatural connection with wildlife. Elements of these concerns directly overlap with the views held by the teacher and students in this study, and in particular, the views espoused by Jacob.

Aspects of the participants’ views on zoos overlap the pro-zoos stance, citing the potential benefits of zoos as fulfilling mission objectives (i.e., recreation, research, education, and conservation) as justification for zoos (see for example, AZA, 2004 and 2015; Bertram, 2004; CAZA, 2015; Chiszar, et al., 1990; WAZA, 2015). Much like the participants in this study, supporters of zoos contend that zoos can offer benefits such as contributing to research; protecting and helping wildlife, particularly through conservation efforts; providing people with enjoyment, inspiration, and education through firsthand experiences with wildlife—all of which are believed to counter the arguments against zoos.

**Balancing animal and visitor needs in zoos.** The participants in this study also held differing views on balancing animal needs with visitor needs in zoos. For example, the teacher and students acknowledged issues around enclosure design, considering the positives and the negatives for both animals and zoo visitors. They commented that large enclosures with more privacy and space are desirable for animals, but at the same time create less visibility of animals, thereby decreasing the entertainment value for zoo visitors. Some students, including Jacob, prioritized animal welfare over visitor entertainment, stating that viewing animals on safaris or in wildlife parks were preferable to viewing animals in zoos. Concerns about zoo enclosure design can similarly be found in the literature. Research suggests that students held concerns about enclosures and preferred wildlife parks to traditional zoos for reasons related to animal welfare (Tofield et al., 2003; Greaves et al., 1993), whereas others suggest that people place
more importance on being able to view animals than on providing animals with large, natural
c enclosures (Fernandez et al., 2009; Hyson, 2004; Ryan & Saward, 2004).

Some students and the teacher also expressed concerns about using wild animals to
entertain people in zoos and aquariums. The students expressed specific concerns such as:
training animals to perform for people was wrong (Ian, Interview #2); animals may be
negatively affected by having visitors around them too much (Lily, Interview #2); and that
entertainment alone was not justification the existence of zoos (Roberto & Ben, Field Note #6).
The concerns shared by participants overlap concerns about the entertainment mission of zoos
found in the literature (ECO, 2012; Malamud, 1998; Mullan & Marvin, 1999; Wickins-
Drazilova, 2006). Furthermore, Lindburg (1999) cites “the use of animals in entertainment,
especially performing animals” (p. 440) as a specific issue commonly eliciting opposition to
zoos from the animal rights community.

**Establishing identity and roles of zoos in society.** The participants also expressed
differing views relating to the identity and roles of zoos in society. For example, the students
and teacher viewed the entertainment objective of zoos both positively (i.e., it benefits people)
and negatively (i.e., it is a concern because entertainment is achieved at the expense of zoo
animals and/or entertainment alone is not justification for existence of zoos). Conflicting views
on the priority of the entertainment mission is addressed in the literature as well. For example
Hyson (2004) captures the essence of this contradiction of zoos when he states:

> So, what’s a zoo to do? Should zoos abandon the idealistic pursuit of conservation
education in order to embrace their inner Disneyland? Or should they turn in the opposite
direction—throwing out the camel rides and the naming contests and the plush-toy
pandas, and simply giving visitors some stern, straightforward lessons in natural history?
(p. 250)

Embedded in this complexity is the contradictory behaviour of students themselves—
stating that zoo animals should not be used primarily for entertainment purposes, yet
simultaneously expressing a desire to be entertained by animals when visiting the zoo. This paradox is not uncommon in the literature, as other zoo visitors have similarly expressed that education and conservation should be the primary roles of zoos and yet when engaging in an actual zoo visit enjoyment and entertainment are prioritized (Hyson, 2004; Reade & Waran, 1996; Ryan & Saward, 2004; Tofield et al. 2003).

The zoo staff in this study expressed a desire to shift public perception on the roles of zoos in society. They want to be seen as more sophisticated than their predecessors, particularly with respect to the conservation efforts of modern day zoos. For example, Bridgette shared the view that zoos need to “self-promote” and educate the public on what modern zoos do. The desire to shift public perception of zoos is similarly promoted in zoo-based literature (see for example Dierking et al., 2002b; Hyson, 2004; Lindburg, 1999; WAZA, 1993). Hyson (2004) cautions that zoos have had difficulty defining themselves as conservation centres because of their continued emphasis on the entertainment mission (e.g., naming contests and cuddly mascots), as well as the inherent difficulty in shifting the public’s long-standing perception of zoos as places for entertainment.

The heterogeneous nature of the zoo community is another complexity found in both the participants’ views and in the literature. The teacher and students described zoos as varying greatly in terms of their practices and standards of care for animals, much like the way Fàbregas et al. (2012) describe zoos as being heterogeneous in nature. Further, the participants in this case were particularly concerned with issues pertaining to what they deemed substandard or roadside zoos and the regulation of these zoos in Ontario. Similar concerns about roadside zoos, such as questionable standards of care and/or injury to animals, visitors, and owners of these facilities (see for example, WSPA & Zoocheck Canada., n.d., p. 48-52), as well as calls for continued
review and improvement of Ontario’s zoo licensing policies (The Canadian Press, 2012; ECO, 2009 and 2012; WSPA, 2005; WSPA & Zoocheck Canada, n.d.) can be found in the literature.

In response to the complexities and controversy around the roles and identity of zoos in society, some are advocating for zoos to reinvent themselves. For instance, Hyson (2004) acknowledges the struggles faced by zoos to establish their identity and roles in society, and advocates that zoos ought to embrace these positions more critically and openly. He calls for “a wholesale rethinking of zoos’ mission and identity,” whereby zoos “think more critically and openly about their function, their image, their place within the broader cultures of education and entertainment” (Hyson, 2004, p. 250). To accomplish these goals, Hyson recommends that zoos seek deeper understanding on what people feel and think about zoos and their roles in society.

Hancocks advocates for a “zoo revolution” through “acceptance of present shortcomings, awareness of self-delusion and false claims, an earnest degree of self-criticism, and openness to the concerns of others” (2012, p. 1). He offers several specific actions that zoos might take to reinvent themselves, formed primarily on the basis that zoos improve welfare standards for all living creatures and commit to excellence in zoo design. A similar view is espoused by Fernandez et al. (2009, p. 7) who propose that “zoos need to find ways to provide entertainment and education without jeopardizing the animals’ welfare,” including giving zoo staff more control over zoo visitor interactions with animals. Additionally, in recognition of the heterogeneous nature of zoos, Fàbregas et al. (2012) propose that the zoo community as a whole should make an effort to improve the performance of all zoos. They advocate for having professional zoo associations play a significant role in orchestrating this collective goal. It is possible that suggestions for revolutionizing zoos in the literature, such as those shared here, may help address some of the specific concerns about zoos held by the participants in this study.
Interpreting Participant Responses to Multiple Perspectives

The findings from this study lend mixed support for validating Greaves et al.’s (1993) idea that students’ concerns and objections relating to zoos might create a distraction or a resistance to learning in these institutions. The students who held views against zoos did not feel that these views impacted their desire to learn at or about zoos. They did not express any resistance to visiting the participating zoo in this study, as they saw it as a “fantastic zoo” (Jackie, Interview #2) and one of “quality” (Jillian, Interview #2). Jacob, a student who took a consistently strong against-zoos stance, was asked if these views affected his learning or desire to learn in the Zoos and Conserving Biodiversity unit of study. He replied that he was open to visiting the participating zoo and learning more about it. He also shared that the zoo field trip was “informative,” “very good,” and that he “learned a lot” (Jacob, Interview #1). I think a distinction should be noted that although Jacob was open to becoming more informed about zoos, he maintained a consistent against-zoos stance throughout the entire study.

Although students affirmatively responded to learning in and about zoos, their concerns and objections relating to substandard zoos did pose the potential to create some resistance. Specifically, finding suggests that the heterogeneous nature of zoos (Fàbregas et al., 2012) was a factor in determining students’ resistance (or willingness) to learning in a zoo setting. In other words, students were open to learning at the Toronto Zoo, which they viewed as a quality zoo, but they may have resisted participating if the field trip had been to a zoo that they perceived to be substandard.

It was also observed that conflicting views on zoos among students provided some distraction from learning experiences in the classroom. For instance, Jacob and his group members held different views on zoos and consequently, how they should incorporate the role of zoos in tiger conservation in their final action project. Jacob favoured a focus on conservation
organizations like World Wildlife Fund (WWF), and his group mates favoured a focus on zoos’ conservation efforts. Jacob wrote the comment “I hate zoos!” out of frustration during this heated exchange. The boys eventually came to a compromise through the decision to incorporate both zoo and WWF efforts in tiger conservation in their final project. This example shows support for concern raised in the literature that students’ views against zoos might detract from learning (Greaves et al., 1993).

Findings from this study also suggest that the teacher and zoo staff in this study were aware that multiple perspectives on zoos existed among the students, and further, that they made pedagogical choices to respond to these views. This practice aligns with and extends Greaves et al.’s (1993) suggestion that teachers should be aware of concerns and objections relating to zoos and the possible impact of these views on learning.

The zoo staff responses (i.e., educate about zoos; create a sharing session) are preliminary and begin to develop our understanding of an area in the literature that is not well documented. The staff aimed to change what they perceived to be negative perceptions of zoos by educating people about zoos, particularly about their roles in conservation, research, and education. The larger zoo community appears to similarly promote responding to the poor public perception on zoos through educating people about zoos, their potential benefits, roles, and missions (AZA, 2004). The teacher and students noted that the zoo staff’s approach during the Zoos and Conservation presentation was not strongly pro-zoos, particularly because some limitations of zoos were shared.

The teacher’s pedagogical responses to multiple views on zoos (i.e., educate about zoos; expose students to alternative conceptions of zoos; and model and encourage the sharing of differing views) also contribute to a relatively unexplored area in the literature. The teacher wanted students to become more informed about zoos regardless of their personal views on
zoos, and he therefore provided them with multiple learning opportunities both at the zoo and in the classroom. Students were exposed to learning about zoos through a variety of activities in the classroom including: selected readings on related topics such as “Zoos and Captive Breeding”; an Internet-based research mini-project focusing on missions and facts relating to zoos in North America; debates on ethical dilemmas related to zoos and/or conservation in small student groups; documentary videos focusing on zoo animals, conservation, and the behind-the-scenes work of zoo staff at a professionally-managed, modern zoo; a teacher presentation entitled Zoos and Misperceptions; and a culminating final project centered on zoos and/or conservation topics which encouraged students to engage in some form of sociopolitical action.

Students were also exposed to multiple learning opportunities during the zoo field trip including: a presentation on zoos and conservation delivered by the zoo staff; unstructured exploration time during which students were encouraged to read zoo signs and talk to the zoo staff; a volunteer-led tour of zoo exhibits; and a behind-the-scenes visit to the white rhinoceros holding area and the zoo’s animal nutrition centre. These learning opportunities highlighted zoo practices and related issues such as: animal behaviour and enrichment; reproduction, reintroduction, conservation issues and projects; and zoo animal nutritional science.

Keep in mind the context within which this study occurred. Students learned about zoos as part of a Grade 11 biology unit of study centering on the following objectives:

- informing the students about current conservation issues associated with modern zoos, from a variety of perspectives;
- promoting positive conservation-related knowledge, attitudes, and actions among the students;
- providing a chance for the students to think critically, examine their own values and beliefs, and formulate their own opinions; and
• encouraging the sharing of opinions, thoughts, and ideas through dialogue in small groups and in whole class discussions.

Specifically, classroom and zoo learning opportunities related to science, technology, society, and environment (STSE) expectations found in the Ontario secondary school science curriculum (Ontario Ministry of Education and Training, 2000). In this way, students were encouraged to develop “several complex cognitive tasks including understanding multiple perspectives, critical thinking, and decision making” (Pedretti & Nazir, 2011, p. 612), and to consider both scientific data and subjective value judgments (Robottom, 2012).

Logan’s utilization of these strategies and emphases, particularly those aligning with the eco-justice and value-centred currents of the STSE education movement (Pedretti & Nazir, 2011) reflect a more challenging approach to teaching science curriculum. Although more difficult to enact, such approaches, along with informal learning experiences such as a zoo visit, can promote a broader exposure to science and technological culture for students (Hodson, 2003; Sullenger, 2006; Sullenger & Turner, 2015).

The teaching and learning emphases in the Zoos and Conserving Biodiversity unit of study also align with broadening the science curriculum in ways suggested by Hodson (2003). His four-levelled approach to science curriculum includes encouraging students to: learn science and technology, learn about science and technology, do science and technology, and engage in sociopolitical action (p. 658). Logan likewise provided the students with opportunities to: gain understanding of science and technology as it relates to zoos and/or biodiversity conservation (e.g., details on captive breeding, reintroductions, animal nutrition); learn about zoos (e.g., through multiple opportunities students were exposed to the nature of zoos and their missions); participate in science and technology tasks (e.g., microscope work; taxonomy and classification
skill development in school); and engage in sociopolitical action (e.g., the culminating action project relating to a current zoo and/or biodiversity conservation issue).

**Challenges Relating to Teaching and Learning about Zoos**

Given the complex nature of zoos in society and the multiple (and at times conflicting) views on zoos held by the participants in this study, it is not surprising that the teacher and zoo staff faced some pedagogical challenges. Research has found that implementing STSE education emphases and strategies, such as those found in the curricular context of this study, can be challenging for educators (Hodson, 2003; Pedretti, 2003 and 2005; Pedretti & Nazir, 2011; Tsai, 2002). Some challenges include lack of time or resources; lack of support from colleagues, administrators, parents, and students; teacher confidence and competence when teaching science in a way that exposes values, ethics, controversy, and politicization; and concern about ethical implications and long-term consequences (Hodson, 2003; Pedretti & Nazir, 2011; Tsai, 2002).

The pedagogical challenges faced by the teacher and zoo staff in this study often tied into teaching and learning about controversial or sensitive topics related to zoos. These challenges will be now be discussed in three main areas of concern, with some overlap across these areas: 1) educator positioning; 2) fairly addressing students’ initial conceptions; and 3) potential influence on students.

**Educator positioning.** The teacher and zoo staff in this study were faced with the pedagogical challenge of how to position themselves on zoo-related issues and tensions, both directly and indirectly. Pedretti (1999) questions how educators might position themselves when teaching about sensitive or controversial issues, asking “Whose values (if any) do teachers promote? What kind of intervention do teachers plan for? How do teachers position themselves amidst controversy and multiple perspectives in the classroom?” (p. 180). Similar questions can be asked of the educators in this study—whose views on zoos should be shared? What
information on zoos should be brought into teaching and learning activities? How do you respond when students challenge your personal views on zoos? How do you position yourself when tension arises between students?

No clear answer exists in the literature on how to position oneself when teaching about controversial topics or sensitive issues (see for example, Hand, 2008; Hand & Levinson, 2012; Oulton, Dillon & Grace, 2004; VanRooy, 2004; Warnick & Smith, 2014), and very limited research exists on how this applies to teaching and learning about zoos specifically (AZA, 2004; Bertram, 2004; Davidson et al., 2009). VanRooy suggests that when bringing a controversial issue into the science classroom, the teacher assumes one of three roles: neutrality, commitment, or balance.

In this study, the teacher’s approach could be described as a blend of VanRooy’s balanced and commitment roles. The findings suggest that he took on a balanced role, as he aimed to educate students about the benefits and drawbacks of zoos through the Zoos and Conserving Biodiversity unit. It could also be argued that the teacher took on a commitment role, as he freely shared his own perspectives on zoos throughout the unit.

Warnick and Smith (2014) propose another framework for educator positioning when teaching about controversial issues. Warnick and Smith describe the “soft-directive” approach as one in which the teacher shares his/her own view on an issue but presents an element of “openness to being challenged on an explicitly endorsed position” (p. 240). In this approach the teacher also shares his/her reasoning for adopting a particular view on an issue, thereby teaching students a process by which they may use to form their own views.

I believe that Warnick and Smith’s (2014) soft-directive approach best describes the teacher’s approach to the topic of zoos in this study. Findings in this study show that much like the soft-directive approach: 1) the teacher openly shared his own views on zoos; 2) the teacher
encouraged students to consider and critique multiple views on zoos and he clearly stated that he
did not want students to simply follow along with his established views, but rather they needed
to examine their own values and formulate their own opinions on zoos; he facilitated and
modeled the sharing of opinions and ideas through dialogue in small groups and in whole class
presentations and discussions; and 3) the teacher provided students with multiple learning
opportunities which allowed them to become more informed about current issues related to zoos,
and he often shared the reasoning behind his own views; both of which were done to aid
students in the process of developing their own views.

Preliminary findings from this study suggest that the zoo staff were positioned to change
what they perceived to be negative perceptions of zoos by educating people about them.
However, the zoo staff in this study did not directly facilitate an open dialogue or sharing of
multiple views on zoos or share their personal views on zoos with students, so their positioning
on zoos was implicit in nature. This is not an unexpected finding, as the students and teacher had
more time to establish a relationship, and more opportunities to discuss views on zoos,
compared to the limited one-time visit at the zoo in which the zoo staff and students had spent
time together. The zoo staff’s positioning aligns most closely with VanRooy’s (2004, p. 200)
“commitment role,” as the zoo staff shared a predominately pro-zoos stance and did not seek
dialogue on alternative views on zoos with the students, although they did share some
limitations of zoos. In the literature, the larger zoo community appears to support a need for
zoos to develop strategies for responding to “controversial topics” and “sensitive issues” such as
“the keeping of animals in captivity,” “the facility’s position on evolution,” and “euthanasia”
(AZA, 2004, p. 12), in recognition of noticeable shifts in public perceptions and opinions of
zoos. Considering that findings in this study are preliminary and that this is a relatively
unexplored topic in the research literature, I believe that further study is warranted in order to
form a deeper understanding on how zoo staff face these challenges.

**Alternative conceptions.** The teacher also faced the pedagogical challenge of how to
respond to students’ pre-instructional conceptions of zoos. He believed that some of the
students’ preliminary conceptions were based on naïve or limited notions about zoos. He chose
to respond by exposing students to alternative ways of thinking about zoos, including directly
addressing what he termed misperceptions about zoos in a presentation to the class. Addressing
students’ conceptions of zoos in a fair and respectful manner, particularly on topics which might
be considered sensitive in nature, is inherently challenging.

Furthermore, concern exists in the literature around the use of the word “misconception.”
This language may be construed by some as de-valuing students’ alternative conceptions.
Research focusing on conceptual change is vast and beyond the scope of the current study (see
for example, Duit & Treagust, 2003; Treagust & Duit, 2008), however, I believe that some
mention is warranted around the usage of some terms commonly found in this body of literature
as they pertain to this study. The participating teacher and students often referred to naïve or
limited conceptions of zoos as “misperceptions” or “misconceptions” whereas researchers
focusing on conceptual change more commonly uses the terms “pre-instructional conceptions”
or “alternative conceptions” (see for example, Duit & Treagust, 2003).

The teacher’s use of the term “misconception” overlaps with Bertram’s (2004) utilization
of the term. Bertram explicitly addresses what he calls “widespread misconceptions about zoos”
(p. 199) by providing the reader with counter-arguments to what he sees are common objections
about zoos. In form and in concept, Bertram’s paper is organized in much the same manner as
the teacher’s Zoos and Misperceptions presentation. Both directly address what they perceive to
be limited conceptions of zoos by first identifying a list of contested phenomena observed in 
zoos, and then by presenting alternative conceptions to explain these phenomena.

The teacher’s use of the term “misperception” also aligns with the term “naïve 
conceptions” coined by Fox-Parrish and Jurin (2008), in that they both consider students’ 
conceptions to be underdeveloped or naïve. Fox-Parrish and Jurin share the same pedagogical 
view as the teacher, that educating students about an issue might help students to build on naïve 
conceptions. In this study, the teacher’s approach to educating students about zoos and providing 
them with alternative ways of thinking about zoos gave them the opportunity to develop more 
informed conceptions of zoos – be they for or against zoos.

**Educator influence.** The potential issue of influence and power relationships with 
students was another pedagogical challenge facing the educators in this study. Although the 
teacher in this study openly shared his own views on zoos, he did not want the students to 
simply adopt these views and he clearly stated this to his students: “It’s not my job to tell you 
what’s right or wrong [about zoos]. It’s your decision.” (Logan, Field Note #3). Zoo educators 
on the other hand, expressed a desire to educate people on the potential benefits of zoos, and 
their roles in society in order to change what they perceived to be negative views on zoos.

Students felt that the teacher placed a greater emphasis on the for-zoos stance in the Zoos 
and Conserving Biodiversity unit of study. However, they also noted that views expressed 
against-zoos were respected by the teacher and other students, and that they could freely voice 
their opinions in the classroom. For example, concerns and objections relating to roadside zoos 
were shared in the presentation on zoo standards, and Jacob freely expressed his against-zoos 
views in the classroom. Findings also show that the students felt that the zoo staff did not come 
across as being too strong in their pro-zoos stance during the field trip activities, but were open 
to sharing some of the limitations of zoos with them as well. For example, the students reflected
that the zoo staff helped them better understand the efforts put forth by specially-trained staff towards animal enrichment and nutrition at the Toronto Zoo, and that limitations or unknowns exist in these endeavors.

Balancing one’s positioning on issues so that it empowers students versus indoctrinating them into one’s belief system is a concern that can be found in the literature (Davidson et al., 2009; Pedretti & Nazir, 2011; Warnick & Smith, 2014) and which is relevant to this context as well. Warnick and Smith express concern that if a teacher endorses a position when teaching about a controversial topic or sensitive issue, their social or epistemic authority may influence students’ positioning to please the teacher or because they are seen as an expert.

Findings from this study show support for Warnick and Smith’s (2014) concern that the students might have accepted the views held by the teacher and zoo staff because they saw them as holding social and/or epistemic authority. For example, a student named Jillian saw herself as a “blank page” when it came to the topic of zoos, and shared that information provided by the teacher and zoo educators had an influence on how she formed her views on zoos.

Students also cited the teacher’s Zoos and Misperceptions lesson as being particularly influential in the formation of their views on zoos, including leading them to consider alternative conceptions of zoos. Interestingly, some of the shifts observed in students’ perspectives on zoos directly overlap with the teacher’s positioning on these topics, including: the idea of zoos as heterogeneous communities; zoos as conservation centres; and concerns about zoos needing to balance the need to entertain visitors with the needs of zoo animals. A specific example of this comes from Julia, who stated, “Now I like them [zoos] a lot more after going through the misconceptions and seeing how much they actually do for the conservation of animals” (Julia, Interview #2). Her comment directly ties her evolving views to the information shared by the teacher in one his presentations. Findings therefore suggest that the educators’ views in this
study may have influenced the students, either directly or indirectly, as they formed their own views on zoos and speaks to the great responsibility held by educators in this role.

**Chapter Summary**

In the first half of the discussion, interpretations of the participants’ multiple perspectives on zoos suggest that they are reflective of the complex and sometimes contradictory nature of modern day zoos (see for example Fernandez et al., 2009; Hancocks, 2012; Hyson, 2004; Lindburg, 1999). At times, these views evoked concerns about zoos that are similarly found in the literature and can be categorized into three main areas, with some overlapping concerns between categories: 1) justifying the existence of zoos; 2) balancing animal and visitor needs in zoos; and/or 3) establishing identity and roles of zoos in society. Some suggestions for reinventing zoos from the literature were also shared.

The second half of the discussion aimed to interpret the participants’ responses to multiple views in the classroom. The students generally reported that they were motivated to learn about zoos in the Zoos and Conserving Biodiversity unit of study and that their views against zoos did not impact their learning. However, differing student views were occasionally in tension in the classroom and students expressed resistance to learning in the zoos that they perceived to be substandard. These findings lend mixed support for Greaves et al.’s (1993) concern that student views against zoos might create a distraction or a resistance to learning in these institutions.

The teacher in this study appeared to adopt a soft-directive approach (Warnick & Smith, 2014) to teaching about sensitive and controversial curriculum relating to zoos. In likeness to characteristics of this approach, the teacher shared his views on zoos with students; asked the students to critically examine his and others’ views; and provided the students with multiple learning opportunities to help them develop their own informed views on zoos. Preliminary
findings from this study suggest that the zoo staff aimed to change what they perceived to be negative attitudes toward zoos by educating people about zoos. They adopted a commitment role (VanRooy, 2004), that is, held a predominately pro-zoos stance and did not explicitly seek dialogue on alternative views on zoos with students.

Some pedagogical challenges faced by the teacher and zoo staff included: how to position oneself on an issue; how to address pre-instructional or alternative conceptions on zoos held by the students; and the potential influence of one’s views and actions on the students, particularly those developing their own views. Finding a balance between empowering the students versus indoctrinating them into one’s own belief system is a concern that was expressed here, and can also be found in the literature (Davidson et al., 2009; Pedretti & Nazir, 2011; Warnick & Smith, 2014). In recognition of noticeable shifts in public perceptions and opinions of zoos, the zoo community appears to acknowledge a need for zoos to continue to develop strategies for responding to “controversial topics” and “sensitive issues” (AZA, 2004, p. 12), and the same can be said for educators in school settings. In the next (and final chapter) I offer some concluding thoughts and implications for consideration in practice and future research.
CHAPTER SEVEN:
SUMMARY, IMPLICATIONS, AND REFLECTIONS

Chapter Seven begins with a synopsis of the research, followed by the presentation of several implications and considerations that have emerged from this study for teachers and zoo staff. Researcher reflections and suggestions for further research are also discussed. This chapter concludes with some final thoughts about this research.

Summary of Aim and Structure of Study

This study took an interpretive and naturalistic approach to inquiry (Denzin & Lincoln, 2000; Lincoln & Guba, 1985), through the use of a case study research design (Creswell, 2008; Stake, 2000; Yin, 1994). Over the course of eight months, insight into the participants’ experiences and perspectives was gained as I took on the role of participant-observer (Marshall & Rossman, 1999). In this role I participated in, and observed, the activities and interactions among an experienced secondary school science teacher and his Grade 11 biology class of 14 students. During this time the students and teacher were engaged in a unit of study focusing on zoos and biodiversity conservation set in the science classroom including a one-day visit to a large professionally-managed zoo.

The curricular unit of study aligned with science, technology, society, and environment (STSE) education emphases and strategies, as well as STSE-themed provincial curriculum objectives. In this way, zoos and biodiversity conservation were explored in the science classroom and at the zoo through consideration of scientific evidence and logical thinking as well as sociocultural, political, value-based, and ethics emphases. Through a variety of activities and lessons the students were encouraged to develop positive conservation-related knowledge, attitudes, and actions; engage in critical thinking and examination of one’s own values and beliefs; informed personal opinions; use dialogue as a way of sharing ideas and perspectives.
Data collected in this case included field notes written during my observation and participation with the teacher and students; transcripts of interviews conducted with the students and teacher before and after the unit of study; teacher-researcher meeting notes; survey responses from the teacher and students completed before and after the unit of study; transcripts of interviews with 11 zoo staff; and supporting documents from the classroom and zoo (e.g., student assignments, zoo pamphlets, and zoo educational program information). The zoo staff had been employed or volunteering with the participating zoo for at least one year prior to the study. Their positions at the time of the study included: manager, departmental supervisor, departmental coordinator, curator, school workshop leader, and volunteer.

The purpose of this study was to develop a deeper understanding of the participants’ (students, teacher, and zoo staff) perspectives and experiences relating to zoos during a biodiversity conservation unit of study, in a zoo setting and in the science classroom. Within this context, the following research questions were explored:

1) What are the participants’ (students, teacher, and zoo staff) perspectives on zoos?

2) How do the participants respond to multiple perspectives on zoos, in the classroom and at the zoo?

Qualitative data were systematically analyzed using the constant comparative method to identify overarching themes in the data (Lincoln & Guba, 1985; Maykut & Morehouse, 1994). These significant themes, along with meaningful experiences and events in the case, were then used to construct six narrative vignettes through the narrative analysis process (Polkinghorne, 1995). The intent of these vignettes was to depict significant participant perspectives and experiences through story. I then presented a discussion of the findings with connections to the literature.
Summary of Findings and Discussion

Participant Perspectives

The findings show that the teacher and the majority of the students held mixed views on zoos. Mixed views were defined as concurrently held views for and against zoos, or views in support of zoos limited by certain conditions or stipulations. The for-zoos views held by the teacher and students focused on their potential to provide enjoyment, education, and inspiration for people, as well as their potential to help and protect animals. The against-zoos views held by the teacher and students focused on the captivity of wild animals in zoos (i.e., confinement in unnatural habitats), perceived poor standards of care for animals, and the use of animals for entertainment purposes. One student in this study held a consistently strong against-zoos stance throughout the study, which at times created tension between this student and other students who held differing views.

It was found that the students’ perspectives on zoos evolved over the course of the study. This included the students starting to see zoos as a heterogeneous community (Fàbregas, Guillén-Salazar, & Garcés-Narro, 2012) in which variable standards of practice can be found among members of the zoo community, as well as centres for biodiversity conservation. As students developed deeper understandings of zoos, shifts were observed in the emphases for or against zoos in their mixed views. For some students, concerns and objections relating to zoos became stronger and for other students, views in support of zoos became stronger. Jacob’s against-zoos views remained firm, although he did reflect on having positive learning experiences in this unit of study.

Views in support of zoos held by the staff focus on the potential for zoos to provide enjoyment, education, and inspiration for people, as well as on their contributions to research and biodiversity conservation. These views directly align with the mission objectives of modern
day zoos. The zoo staff held concerns about poor public perception of zoos, and expressed a desire for modern day zoos to be seen as sophisticated conservation centres.

**Zoos as Complex Places**

The nature of zoos in society is complex as the goals of modern day zoos (i.e., animal welfare, education, conservation, research, entertainment, business and profit) can be contradictory (Fernandez, Tamborski, Pickens, & Timberlake, 2009; Hancocks, 2012; Hyson, 2004). In addition, arguments “for” and “against” zoos are commonplace (Bowman, 2008; Chiszar, Murphy, and Iliff, 1990; Lindburg, 1999; Wickins-Drazilova, 2006), and trends noted by the zoo community indicate that concern for zoo animal welfare is increasing amongst the general public and animal welfare groups (AZA, 2004, p. 4).

Findings from this study suggest that similar complexities, tensions, and issues surrounding modern day zoos in society were reflected in the participants’ perspectives on zoos. The nature of these views centered primarily on justifying the existence of zoos, balancing animal and visitor needs in zoos, and/or establishing the identity and roles of zoos in society. These topics, which can be considered sensitive and/or controversial in nature, emerged throughout the Zoos and Conserving Biodiversity unit of study (AZA, 2004; Dearden, 1981; VanRooy, 2004).

The students responded to multiple views on zoos in various ways. Findings indicate that they felt comfortable with openly sharing their views with the teacher and with each other. For example, one student group chose the topic of zoo standards for their action project, and openly shared their views (for and against zoos) with the entire class.

On the whole, the students reported that their concerns and objections did not impact their desire or motivation to learn and about zoos, however, occasional tension over differing perspectives on zoos did arise among the students creating small disruptions in the classroom.
For example, when Jacob and two other group members worked together on their action project, an impasse was reached when they could not find common ground on their opposing views on zoos. Jacob then expressed frustration toward these group members over their clashing opinions on zoos, and wrote “I hate zoos” in his notes. These students were eventually able to reach a compromise with the teacher’s support. The students also expressed a resistance to learning in what they perceived to be zoos of substandard quality, or what are commonly called roadside zoos (WSPA & Zoocheck Canada., n.d.). This finding suggests that the heterogeneous nature of the zoo community (Fàbregas et al., 2012) may be a determining factor in the students’ willingness to learn in, and about, zoos.

The students expressed that they were motivated and open to learning about zoos in the Zoos and Conserving Biodiversity unit of study, even when they held views against zoos. For example, Jackie, Jillian, and Tessa, chose to focus on zoo standards for their action project topic which aimed to educate their peers about zoos. In particular, these students wanted to raise awareness about some of the concerns and objections related to roadside zoos and the regulation of zoos in Ontario. This included concerns around standards of care for zoo animals and documented injuries to owners and visitors in roadside zoos (WSPA & Zoocheck Canada., n.d., p. 48-52). This student group also aimed to educate their peers about a perceived need for improving the regulation of zoos in Ontario (ECO, 2009 and 2012; WSPA, 2005; WSPA & Zoocheck Canada, n.d.).

**Teacher and Zoo Staff: Practices and Positions**

The teacher responded to multiple perspectives on zoos in the classroom through various pedagogical approaches, including: educating students about zoos; presenting alternative ways of thinking about zoos; and encouraging and modeling the sharing and negotiating of multiple views. Findings suggest that educating the students about zoos was a predominant theme in
these responses. In Logan’s own words, “I want to see that the students are educated about the roles of the zoo” (Logan, Interview #1), and furthermore, he wanted students to become more informed regardless of whether they held views for or against zoos. Logan provided students with information about zoos through a variety of activities in the classroom and encouraged students to learn more about the zoo by reading signs and talking to staff during the zoo field trip.

Preliminary findings from this study suggest that the zoo staff responded to multiple perspectives on zoos by educating the students about zoos and by creating a sharing session. For example, during the Zoos and Conservation presentation the zoo staff shared both the positive aspects of zoos as well as some limitations. Educating students about zoos was also a significant theme. For instance, Russell shared his aims to educate students about zoos and their role in conservation:

I think we do try to change attitudes a little bit with that [Zoos and Conservation presentation]. We try to show what we do at zoos and sometimes we have negative publicity to believe that we are just there to show animals, that we are not conservation oriented . . . and I would hope that they would leave knowing that the zoo does a lot of things that people don’t know about. (Russell, Interview)

Russell and other zoo staff members advocated for shifting public perception of zoos by educating the public about what modern day zoos do, particularly with respect to research and conservation. The need for zoos to educate the public about the evolution of zoos from simple menageries to conservation-focused, professionally-managed zoological parks, and for zoos to more clearly define themselves to the public, are notions that are similarly found in the zoo-based literature (AZA, 2004; Hyson, 2004).

The teacher and zoo staff faced some pedagogical challenges when responding to multiple views on zoos, particularly when sensitive or controversial topics were part of these teaching and learning experiences. Namely, how to position oneself on issues, how to fairly
address alternative conceptions on zoos, and concern over the potential (direct or indirect) influence that the teacher’s actions and views might have on the students.

Findings from this study lend support for concerns voiced in the literature relating to influence of the teacher over students and power relationships among students and teachers (see for example, Davidson, Passmore, & Anderson, 2009; Pedretti & Nazir, 2011; Warnick & Smith, 2014). Both the teacher and zoo staff appeared to have the potential to be seen as an authority figure, and therefore their positioning on zoos and related issues may have been influential on the students, especially for those students who had not fully developed their own views on zoos prior to the Zoos and Conserving Biodiversity unit of study.

Implications for Practice and Future Research

There are several implications for practice and future research stemming from the findings and discussion in this study. As with other case studies, this work is bounded by the context in which the study took place. One should therefore be cautious in broadly applying the results obtained from this study to other settings, although it is hoped that aspects of this study are of relevance to other research and/or teaching and learning contexts.

Findings from this study indicate that the complex and multi-dimensional nature of zoos in society were reflected in the views held by the participants, and that responding to these views presented some pedagogical challenges for the zoo staff and the teacher. This has implications for how teachers and zoo staff plan and implement zoo-based programming for students, particularly when it relates to controversial issues or sensitive topics. Further, it creates concern over how teachers and zoo staff make pedagogical choices relative to their own biases, and how they reconcile differing views and related challenges into these choices. These challenges and concerns in turn provide opportunities for future research.
Considerations for Teachers

In this section some implications for teachers are proposed. This includes considering: (1) engaging in professional learning activities to develop a variety of pedagogical approaches for addressing complex topics such as zoos; (2) seeking insight into students’ views, preferences, and interests related to zoos to help inform pedagogical choices; and (3) taking a critical approach to studying zoos (i.e., embracing the complexity of zoos as opportunities for extending learning opportunities); and (4) thinking about teacher positionality. Each of these is discussed below in more detail.

The teacher in this study was an experienced teacher with an extensive formal educational background, all of which helped inform his practice. His formal education included graduate courses on the topics of STSE education, as well as teaching and learning science in informal learning sites like the zoo. For other teachers, such as those who are new and inexperienced, or those holding different specializations, navigating through a similar pedagogical landscape could prove problematic. It is certainly not feasible that every teacher will have the same extensive professional development opportunities as the teacher in this study. However, teachers may consider engaging in professional learning activities which could help them develop a variety of pedagogical approaches when dealing with complex topics, such as zoos.

Teachers may also benefit from simply being aware that multiple views on zoos are likely to exist among their students. They may want to gain an understanding of the specific views and interests relating to zoos held within their student group, and to make pedagogical choices suited to the needs of these students (Davidson et al., 2009). This might be accomplished through a pre-unit assessment or survey; informal class discussion such as in a community circle; or during a teacher- or student-led introductory presentation on zoos. This
approach aligns with constructivist learning theory trends in education which advocate for differentiating instruction for students in terms of content, process, and/or product based on students’ interests and learning preferences (Tomlinson, 1999). In this way, the educational benefits stemming from a zoo-based learning experience might be enhanced for students, particularly for those who are reluctant to participate in zoo-based learning.

For example, students in Logan’s class may have been interested in learning more about the Toronto Zoo’s Puerto Rican crested toad conservation project, and could have explored various aspects of this project based on their learning personal preferences. Students with an interest in technology could have explored the development and function of the radio transmitter tracking device; or students with an interest in design might have explored the innovative design process used to create swimwear for such an unusual purpose. Alternatively, students in Logan’s class might have been interested in learning more about a particular zoo topic or affiliation that did not come up in school or zoo discussions. A specific example that comes to mind in this case is the Turtle Island Conservation initiative affiliated with the Toronto Zoo, which supports and promotes indigenous ways of understanding. The mission of this project is to create a partnership “with First Nations communities to preserve cultural and natural landscapes” (Toronto Zoo, 2015). Students may have found this aspect of zoos personally relevant or interesting, and might have been motivated to pursue additional learning and possibly take action related to this initiative.

Logan built opportunities for differentiated instruction into his practice, with the most noticeable example coming from the students’ action project assignment. In this assignment, students were given choice on topic (i.e., any topic relating to zoos and/or their role in biodiversity conservation); research processes and sources (e.g., books and websites; conversations with zoo staff; observations of zoo practices; and signage at the zoo); form of
product (e.g., website, PowerPoint presentation); and form of action (e.g., affecting change through a petition, interview, presentation to younger audience). Through this approach, students were able to explore their personal interests relating to zoos and/or biodiversity conservation.

Teachers planning zoo field trips with their students may want to be cognizant that some students may show resistance to learning in zoos that are perceived to be substandard. Although it would be impossible for a teacher to predetermine (and/or meet) all of his/her students’ requirements for a “quality” zoo, generally speaking, selecting a zoo that is professionally managed and regulated may go a long way toward having students participate more fully on a zoo field trip.

Students’ pre-instructional or alternative concepts on zoos are another consideration. The pedagogical approach used by the teacher in this study was to explicitly address what he termed ‘misconceptions’ on zoos, or in other words, concepts which he deemed naïve or underdeveloped. Logan’s approach was to educate the students about zoos by providing them with scientific-, logical- and/or value-based alternative concepts relating to common objections about zoos. This approach is supported by researchers who advocate for addressing students’ pre-instructional conceptions (or “misconceptions”) through education (Bertram, 2004; Fox-Parrish & Jurin, 2008).

From a constructivist learner-centred belief system, this is a problematic challenge to address. On the one hand, “all knowledge is personal and idiosyncratic” (Yilmaz, 2008, p. 167) and terms like “misconception” can potentially devalue students’ alternative conceptions (Duit & Treagust, 2003; Treagust & Duit, 2008). On the other hand, constructivist theory postulates that “disequilibrium facilitates learning” and that “contradictions, in particular, need to be illuminated, explored, and discussed” to bring about new learning (Yilmaz, 2008, p. 168).
Ultimately, addressing students’ pre-instructional concepts on zoos requires that teachers examine their own beliefs on learning theory, and make pedagogical choices that fit within their paradigm of choice.

One might also consider taking a critical analysis approach to teaching about zoos to encourage students to engage in open, analytical dialogue on the multi-dimensional aspects of zoos, including the aspects of zoos that are not made explicit. Through such an approach students’ concerns about zoos could be acknowledged and students’ views on zoos might be broadened. This approach aligns with the goals of teaching a zoo-based unit of study from an STSE education framework, in that it promotes understanding within sociocultural, political, ethical, and value-based frameworks (Pedretti & Nazir, 2011).

For example, students and teacher could explore each component of the STSE focus (i.e., science, technology, society, and environment) as they relate to zoos. This might include exploring the roles that zoos play in Canadian society and economics, such as: utilizing corporate sponsors and advertisements; providing employment and volunteer opportunities to citizens; creating a demand for nutritional and medical supplies for zoo animals; and/or employing architectural and construction services when building animal enclosures. Learning activities based around this approach might also focus on the environmental impact of zoos. This might go beyond discussing zoos’ contributions to conservation education and initiatives, to asking questions like: Who is funding zoo conservation research? What conservation measures are being taken on zoo grounds? What are the waste management practices of the zoo? How does the zoo decide on merchandise for sale in the gift shops?

Teaching about zoos through a critical approach, although potentially beneficial to students, may create challenges for teachers. Research on STSE education approaches similar to those employed in this study reveal that teachers can experience challenges such as lack of time,
resources, and/or support from colleagues, administrators, parents, and students (Pedretti & Nazir, 2011; Tsai, 2002). Furthermore, teachers should be aware that their confidence and competence may be challenged when teaching science in a politically charged manner (Hodson, 2003), or that ethical implications from teaching in such a manner may cause some discomfort for themselves or others (Pedretti & Nazir, 2011).

Regardless of a teacher’s experience and background, teachers will need to make pedagogical decisions on how to best position themselves on zoo-related issues. Positioning on an issue may be implicit (e.g., positioning in the form and nature of curriculum covered in class) or explicit (e.g., openly sharing one’s views on zoos with students). No clear answer exists in the literature on how to position oneself when teaching about sensitive issues or controversial topics (Hand, 2008; Hand & Levinson, 2012; Oulton, Dillon & Grace, 2004; VanRooy, 2004; Warnick & Smith, 2014). Educators may consider using a similar approach to the one used by the teacher in this study, whereby views on zoos were explicitly shared, considered, and critiqued through multiple learning opportunities. This educator positioning aligns with the soft-directive approach advocated by Warnick and Smith, and its strengths are that it aims to empower students to make informed decisions and establish their own views, and tries to avoid indoctrinating students into the teacher’s belief system. Whatever positioning that teachers choose to employ when teaching about zoos, they might carefully consider its potential effects on students, particularly those who are developing their own perspectives on zoos.

Considerations for Zoo Staff

Some of the pedagogical implications and concerns discussed in the previous section may be applicable to zoo staff professionals, although some may not. For instance, the political nature of a critical approach to zoos might be more feasible for the teacher than for zoo staff engaging in a one-day field trip with students. It is possible that zoo staff may not feel
comfortable addressing controversial issues or sensitive topics with students that they have just
met, or that they do not have an opportunity to explore such issues during a one-day visit to the
zoo owing to limited instructional time and/or interactions with students.

In this section I will suggest some implications stemming from this research which may
be more applicable to zoo staff. This includes consideration that: (1) school groups do not
necessarily see zoos as complex places (i.e., may not be aware of zoos’ conservation efforts, or
see zoos as existing within a highly variable community) that these visitors may benefit from
being educated about zoos and their complexities; (2) positioning on zoos might affect student
learning and possibly alienate those with pre-existing concerns or objections to zoos; (3)
professional activities that might help develop pedagogical approaches for responding to diverse
views on zoos; and (4) continued and extended opportunities for open dialogue within and
outside the zoo community may help address public concerns about zoos.

It may be helpful for zoo staff to be aware that students and teachers do not always come
to zoos with the perception that zoos are conservation centres, nor do they understand that the
zoo community is highly variable in terms of their practices and standards. Educating school
group visitors about these aspects of zoos may help to advance zoo staff’s objective to create
more positive and/or informed public perceptions of zoos.

The sharing session approach used by zoo staff in this study positioned them as
implicitly pro-zoos. This positioning was generally well-received by the students and teacher in
this study, and it appeared to help students to stay open to being informed about zoos and their
roles in biodiversity conservation. Zoo staff might carefully consider that their positioning on
zoos may affect how students engage in learning while at the zoo, and some approaches may
alienate students who come to them with pre-existing concerns about zoos.
Knowing that teachers and students come to the zoo with multiple views on zoos, it may be helpful to develop professional learning activities for zoo staff (this could be done for example, in-house, or in collaboration with another learning institution). Such opportunities could promote further inquiry into understanding the specific views of their visitors. Zoo staff might consider engaging in professional development activities that help them to extend their pedagogical strategies for responding to diverse views. Such activities would appear to align with activities promoted by the zoo community such as: “collect and/or commission research which will help us address [the] true prevalence of animal rights’ beliefs and concerns amongst the general public; and to “assess national and regional dynamics”; and in addition to:

Develop key messages related to controversial topics/sensitive issues and staff training related to the delivery of these messages. Examples include: responses to questions related to the impact of AZA Zoos and Aquariums, the keeping of animals in captivity, the facility’s position on evolution, euthanasia, etc. (AZA, 2004, p. 11)

Increasing transparency on zoos by extending opportunities for critical and open dialogue within, and possibly even outside, the zoo community is another important consideration. In this vein, recommendations made by Rabb and Saunders (2005) to continue fostering caring concern and behaviour for animals and nature; as well as by Hyson (2004) to embrace the unique roles of zoos in society and to seek deeper understanding on what people feel and think about zoos, may prove to be useful points for these discussions. Such dialogue may go a long way in addressing concerns about zoos, such as those espoused by the participants in this study and by other students and teachers in the literature (Greaves’ et al., 1993; Tofield et al., 2003).

Considerations for Future Research

Several possible avenues for future research emerged as I reflected on this study. This includes the potential to explore: (1) more deeply into the perspectives and responses of zoo
staff participants; (2) the prevalence of views against zoos in other school groups or teaching and learning communities, as well as strategies used by other teachers to respond to differing views on zoos; and (3) how educators might improve their practice so that they engage in fair responses to teaching and learning about sensitive topics and issues, such as those relating to zoos. In the following sections I discuss each point in more detail.

First, I found myself wanting to delve deeper into the perspectives and responses of the zoo staff participants, as these findings were preliminary and limited research exists in this area. I propose that future research would be of a sensitive nature and would require a high degree of anonymity to encourage zoo staff participants to speak openly and honestly about their views on zoos, as well as how they currently respond to visitors’ concerns and objections related to zoos in teaching and learning situations. Such research might go beyond this study by examining, for example, how zoo staff interacts with multiple teachers and their classes over a greater length of time than was within the scope of this study. Research of this nature would help address calls from the zoo community to develop a better understanding of people’s views on zoos and strategies for responding to these views (AZA, 2004), and could potentially improve the practice of zoo staff.

Second, I found myself wondering how the views and responses of students and teachers in other zoo-based education contexts compare to those expressed in this study. The nature of this study was such that perspectives of one teacher, one class, and one zoo were studied in great depth. Future research might build on this case by exploring students’ views in a setting whereby the teacher holds a strictly for- or against-zoos stance and shares his/her biased view with students; or perhaps where the teacher employs a neutral approach and students are not explicitly told his/her views. Another related avenue for future research might be in exploring the prevalence of negative views among the main participants in zoo-based
teaching and learning experiences in a given area or district, possibly through a quantitative survey approach.

Third, I question how educators might improve their practice so that they engage in fair responses to teaching and learning about sensitive and controversial topics in general, and relating to zoos in particular. In this study, the students commented that the educators placed a greater emphasis on the for-zoos stance, and that they would have preferred a more balanced approach to zoos in the unit. Since controversy over how to teach sensitive and controversial topics still exists in the literature, future study might focus on the advantages or disadvantages to using a specific approach such as using the SSI model for teaching and learning about zoos (Zeidler & Nichols, 2009).

Finally, I hope that research around the pedagogical challenges facing teachers and zoo staff, in the context of the complex landscape of teaching and learning about zoos might continue. In this research I have identified some concerns around the influence of the position of the teacher and zoo staff on the students and their developing views on zoos. I look forward to the possibility of extending dialogue around the nuances of these connections, as well as developing greater insight into the challenges faced by other participants’ engaging in similar experiences. Certainly, concerns about teacher influence and power relationships with students have been raised elsewhere (Davidson et al., 2009; Warnick & Smith, 2014), and is a key concern in critical theory research (see for example, Freire, 1998; Giroux, 2004). Perhaps future research could delve deeper into these concerns and challenges in a zoo-based teaching and learning context through the lens of a critical theory framework.

**Concluding Thoughts**

AZA-accredited zoos and aquariums report hosting school field trips for over 400,000 teachers and 12,000,000 students annually (AZA, 2015). Findings from this research may help
inform the teaching practices of the many school science educators and zoo staff participating in these and other related zoo-based experiences, which in turn may benefit students.

To conclude, I believe that my study builds on existing research by extending understanding about a zoo-based teaching and learning experience through an in-depth examination of the participants’ views and responses to these views in the classroom and at the zoo. This work contributes to an area not well documented in the literature. Findings from this study add credibility to ideas raised by Greaves et al. (1993) that students hold concerns and objections relating to zoos which may impact their learning in these institutions, and educators participating in zoo field trips need to be aware of this issue.

The current findings are also significant when you consider the broader curricular context of this study. In light of trends in science education such as the emphases and strategies promoted through the science, technology, society, and environment (STSE) education movement, it is likely that multiple and sometimes conflicting perspectives among educators and students will continue to emerge, and perhaps even increase in frequency, in the science classroom.

I believe that understanding the experiences and hearing the voices of the stakeholders (e.g., students, teacher, staff) involved in school visits to informal learning sites such as zoos, is at the core of this research and is significant to improving zoo-based teaching and learning experiences for these participants. It is hoped that by hearing the voices and perspectives of the participants in this study, other researchers and educators will find aspects of this study relevant and useful to their own context, and that it will encourage further dialogue and inquiry in this area of research.
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## Appendix A: Research Project Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Plan of Action</th>
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| Months 1 and 2        | • Initial contact made with the teacher, principal, School Board, and Department Manager at the zoo  
                        | • Began planning and development of the *Zoos and Conserving Biodiversity* unit of study with the participating teacher (note: these meetings continued throughout the entire project)  
                        | • Obtained consent from the participating zoo  
                        | • Began regular communication with the Department Manager and Coordinator at the zoo  
                        | • Began to collect supporting zoo documents |
| (August and September |                                                                                                                                              |
| 2006)                |                                                                                                                                              |
| Month 3 (October     | • Obtained consent from the participating school board  
                        | • Introduced myself to the students and science teaching staff at participating school |
| 2006)                |                                                                                                                                              |
| Month 4 (November    | • Held brief Q&A session about the research study with the participating students in the classroom  
                        | • Distributed and collected the student/parent, teacher, and principal informed consent forms  
                        | • Began classroom observations of the students and teacher  
                        | • Conducted interviews with the students and teacher (before unit of study)  
                        | • Administered the student and teacher survey (before unit of study)  
                        | • *Zoos and Conserving Biodiversity* unit of study began in the classroom  
                        | • Started to collect samples of relevant student work  
                        | • Attended one day zoo visit with the students and teacher and recorded observations during this time  
                        | • *Zoos and Conserving Biodiversity* unit of study continued in the classroom after zoo visit |
| 2006)                |                                                                                                                                              |
| Month 5 (December    | • Observed students as they carried out their action projects in the school and shared their projects with the class  
                        | • *Zoos and Conserving Biodiversity* unit of study completed  
                        | • Administered student and teacher survey (after unit of study)  
                        | • Began student interviews (after unit of study) |
| 2006)                |                                                                                                                                              |
| Month 6 (January     | • Completed interviews with the student and teacher (after unit of study) |
| 2007)                |                                                                                                                                              |
| Month 7 (February    | • Distributed and collected the zoo staff informed consent forms  
                        | • Conducted interviews with the zoo staff  
                        | • Returned to the school to participate in the students’ interview with a local newspaper (for their action project) |
| 2007)                |                                                                                                                                              |
| Month 8 (March       | • Toured the zoo with Department Coordinator  
                        | • Completed the interviews with the zoo staff |
| 2007)                |                                                                                                                                              |
Appendix B: Consent Forms

School Board Request for Participation

Dear Mr. ----------,

I would like to begin this email by introducing myself. My name is Jennifer Skinner-Winslow and I am currently a second year Ph.D. student at the Ontario Institute for Studies in Education, at the University of Toronto. The purpose of this letter is to ask for your permission to involve students and a staff member from the ---------- District School Board in my doctoral research project entitled: Zoos and Schools: Teaching and learning about conservation in science education.

I am specifically requesting permission to invite one class of Grade 11 Biology students attending ---------- High School in ----------, along with their teacher, to participate. Both the teacher, -------, and his principal, ----------, have been approached about the research project and have informally expressed an interest, pending of course, official Board approval.

To meet the requirements of ---------- District School Board’s Policy No. --------, I have included the following in an attachment with this email message: outline of administrative guidelines, summary of the research project, examples of test instruments, and sample informed consent letter for parents and students.

Please feel free to contact me if you have any questions or require further clarification. Thank you for taking the time to review this request and I look forward to hearing from you at your earliest convenience.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate
Department of Curriculum, Teaching and Learning
OISE/University of Toronto
INFORMED CONSENT LETTER: PRINCIPAL

Title of Study: Zoos and Schools: Teaching and Learning about Conservation in Science Education

Researchers: J. Skinner-Winslow and Dr. E. Pedretti (Supervising Professor)

Dear Mr. ----------,

The purpose of this letter is to ask for your permission for ---------- High School to participate in a research study that I will be conducting in the near future.

As you are likely aware from previous correspondence, the purpose behind the research is to explore the experiences of teacher and students in using the zoo for teaching and learning about conservation in science education, as well as the role of the zoo. This study is both timely and appropriate, as it will allow us to better understand the experience of using the zoo to promote conservation in science education, at a time when promoting environmental literacy among students is of great importance.

One Grade 11 biology class (approximately 20 students) at ---------- High School and their teacher, ----------, will conduct their regular science instruction routines (in accordance with the Ontario Curriculum for Grade 11 biology) designed to build upon their conservation knowledge, attitudes, and behaviours, and will take a school trip to the zoo to complement this school-based learning. The teacher and his students will have the option of participating beyond these requirements for the research project.

The data sources for the research project will be: student and teacher observations, interviews, survey responses; assignments, tests, and related curriculum and zoo documents; and interviews with zoo personnel.

Specifically, student participation in the research involves the following:
1. Participating in two 15 minute interviews (one before and one after the unit of study).
2. Allowing the researcher to observe students participate in lessons in the classroom and during a zoo visit.
3. Allowing the researcher to use responses from a written survey (administered before and after the unit of study) to gain better understanding of student conservation-related understanding, attitudes, and actions.
4. Allowing the researcher to use student school work as evidence of learning in this unit.

In addition, teacher participation in the research involves the following:
1. Working with the researcher to develop curriculum for this unit of study.
2. Participating in two 15 minute interviews (one before and one after the unit of study).
3. Allowing the researcher to observe him prepare and deliver lessons in the classroom and during a zoo visit.
4. Responding to a 15 minute written survey (administered before and after the unit of study).

Agreement to your school’s participation will also allow for the use of an audio-recorder during the interviews, for the purpose of completing future written transcripts to be used in data analysis. Explicit consent to such recording will also be sought from each individual student and parent/guardian to ensure that they are fully comfortable with this procedure.

By allowing your school to participate in the study, I will be able to consider students’ and teacher’s experiences in this unit of study. There is no payment for any participants in this study. The direct benefit for students participating in this study is having the opportunity to express their opinions on this particular teaching and learning experience. This study also hopes to enhance their science education experience through the collaboration amongst the researcher, teacher, and zoo. By working with the teacher to develop this unit of study, it is hoped that the collaborative process will further his growth, both personally and professionally. In the future, this research may provide guidance for other educators, both in school and zoo settings, aiming to
maximize conservation education outcomes for their students. The research also provides valuable information to educators and researchers on the merit of this zoo-school partnership in promoting conservation education, by examining the experience from both the teacher and students’ perspectives.

As part of the regular science instructional routine students will be expected to complete class assignments and tests for grading purposes, including a survey which will allow them to reflect on their personal conservation-related understanding, attitudes, and actions. Participating or contributing beyond these requirements in the research study is completely optional (i.e., participating in an interview; allowing me to consider the student’s learning experiences through their assignments and tests, survey and interview responses, and researcher observations); if parent/guardian permission for student participation is not granted, the student will not be asked to participate or contribute in these ways.

Participation in this study is completely voluntary and your school, the teacher, and/or any student may withdraw from the study at any time and for any reason without negative consequences. Students’ grades in the Grade 11 biology course will not be affected by their decision to participate or to not participate in the research. To avoid any conflict of interest between the teacher and the students, the teacher will not know which students are participating in the research study, only the researchers will have access to this information.

There is no obligation for the teacher or students to answer any interview or survey question or to participate in any aspect of this project. This study aims to be as non-intrusive to the regular routine of science instruction as possible, so there are no known or anticipated risks associated with teacher or student participation in this research. The survey and interview questions seek to provide insight into the experiences of the student and teacher and are non-judgmental.

All personal data will be kept strictly confidential and all information will be coded so that teacher and student names will not be associated with observational notes, school work, interview, or survey responses. Only the researchers will have access to this data. Pseudonyms will be used to protect the identity of the school board, school, teacher, and students in research reports, published articles, and/or public presentations based on this study. The audio and written data will be stored for five years in a secure location and will be destroyed after that time. Upon completion of the study, I will provide a summary report to the ---------- District School Board, to ---------- High School, and to the participating teacher.

If you have any questions or concerns about your school’s participation in the study, you may contact the primary investigator, Jennifer Skinner-Winslow or the supervising professor, Dr. Erminia Pedretti at (416) 923-6641 x2527. If you would like more information on the rights of a participant in a research study you may also contact the University of Toronto’s Ethics Review Office at (416) 946-3273.

Thank you very much for taking the time to consider this request.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate, Department of Curriculum, Teaching and Learning,
OISE/University of Toronto
CONSENT FORM: PRINCIPAL

If you consent to your school’s participation in this study, please sign below. Please also indicate if you consent to having the interviews audio-recorded. Please keep the information letter for future reference and return only this page to --------- or Jennifer Skinner-Winslow.

Thank you very much for your help!

As principal of --------- High School, (principal): ______________ , give permission for my school to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Principal: _________________________________________________________________

Date: __________________________

Please check one:

□ I also give permission for the interviews to be audio-recorded.

OR □ I do not give permission for the interviews to be audio-recorded.
INFORMED CONSENT LETTER: TEACHER

Title of Study: Zoos and Schools: Teaching and Learning about Conservation in Science Education

Researchers: J. Skinner-Winslow and Dr. E. Pedretti (Supervising Professor)

Dear -----------,

The purpose of this letter is to ask for your permission to participate in a research study that I will be conducting in the near future.

As you are likely aware, the purpose behind the research is to explore the experiences of teacher and students in using the zoo for teaching and learning about conservation in science education, as well as the role of the zoo. This study is both timely and appropriate, as it will allow us to better understand the experience of using the zoo to promote conservation in science education, at a time when promoting environmental literacy among students is of great importance.

You and your Grade 11 biology class (approximately 20 students) at --------- High School have the option of participating in this study, which goes beyond your regular Grade 11 biology instruction routine and school trip to the zoo. The data sources for the research project will be: student and teacher observations, interviews, survey responses; assignments, tests, and related curriculum and zoo documents; and interviews with zoo personnel.

Specifically, your participation in the research involves the following:
1. Working with the researcher to develop curriculum for this unit of study.
2. Participating in two 15 minute interviews (one before and one after the unit of study).
3. Allowing the researcher to observe you prepare and deliver lessons in the classroom and during a zoo visit.
4. Responding to a 15 minute written survey (administered before and after the unit of study).

In addition, student participation in the research involves the following:
1. Participating in two 15 minute interviews (one before and one after the unit of study).
2. Allowing the researcher to observe students participate in lessons in the classroom and during a zoo visit.
3. Allowing the researcher to use responses from a written survey (administered before and after the unit of study) to gain better understanding of student conservation-related understanding, attitudes, and actions.
4. Allowing the researcher to use student school work as evidence of learning in this unit.

Agreement to your participation will also allow for the use of an audio-recorder during the interviews, for the purpose of completing future written transcripts to be used in data analysis, if you are comfortable with this procedure.

By participating in the study I will be able to consider your teaching and learning experiences in this unit of study. There is no payment for participation in this study. It is hoped that you will directly benefit from the teacher-researcher-zoo collaboration, as a means for growth, both personally and professionally. In the future, this research may provide guidance for other educators, both in school and zoo settings, aiming to maximize conservation education outcomes for their students. The research also provides valuable information to educators and researchers on the merit of this zoo-school partnership in promoting conservation education, by examining the experience from both the teacher and students’ perspectives.

Participation in this study is completely voluntary and you may withdraw from the study at any time and for any reason without negative consequences. There is no obligation for you to answer any interview or survey question or to participate in any aspect of this project. This study aims to be as non-intrusive to the regular routine of science instruction as possible, so there are no known or anticipated risks associated with your participation in
this research. The survey and interview questions seek to provide insight into the experiences of the student and teacher and are non-judgmental. To avoid any conflict of interest between the teacher and the students, you will not know which students are participating in the research study, only the researchers will have access to this information.

All personal data will be kept strictly confidential and your name will not be associated with observational notes, school work, interview, or survey responses. Pseudonyms will be used to protect the identity of the school board, school, teacher, and students in research reports, published articles, and/or public presentations based on this study. The audio and written data will be stored for five years in a secure location and will be destroyed after that time. Upon completion of the study, I will provide a summary report to the ---------- District School Board, to ---------- High School, and to you directly.

If you have any questions or concerns about your school's participation in the study, you may contact the primary investigator, Jennifer Skinner-Winslow or the supervising professor, Dr. Erminia Pedretti at (416) 923-6641 x2527. If you would like more information on the rights of a participant in a research study you may also contact the University of Toronto’s Ethics Review Office at (416) 946-3273.

Thank you very much for taking the time to consider this request.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate
OISE/University of Toronto
Department of Curriculum, Teaching and Learning
CONSENT FORM: TEACHER

If you consent to participating in this study, please sign below. Please also indicate if you consent to having the interviews audio-recorded. Please keep the information letter for future reference and return only this page to the researcher, Jennifer Skinner-Winslow.

Thank you very much for your help!

I (name of teacher) : _______________________________________________________, give my consent to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Teacher: _______________________________________________________

Date: __________________________

Please check one:

☐ I also give permission for the interviews to be audio-recorded.

OR ☐ I do not give permission for the interviews to be audio-recorded.
INFORMED CONSENT LETTER: PARENT/GUARDIAN AND STUDENT

Title of Study:  Zoos and Schools: Teaching and Learning about Conservation in Science Education

Researchers:  J. Skinner-Winslow and Dr. E. Pedretti (Supervising Professor)

Dear Parent/Guardian,

I would like to begin this letter by introducing myself. My name is Jennifer Skinner-Winslow and I am currently a second year Ph.D. student at the Ontario Institute for Studies in Education at the University of Toronto. Prior to beginning this program of study, I was an intermediate science teacher for five years.

The purpose of this letter is to ask for your permission for your son/daughter to participate in a research study that I will be conducting in the near future.

The purpose behind the research is to explore the experiences of teacher and students in using the zoo for teaching and learning about conservation in science education, as well as the role of the zoo. This study is both timely and appropriate, as it will allow us to better understand the experience of using the zoo to promote conservation in science education, at a time when promoting environmental literacy among students is of great importance.

Mr. ‘s Grade 11 biology class (approximately 20 students) at High School will participate in regular science lessons (in accordance with the Ontario Curriculum for Grade 11 biology) and will take a school trip to the zoo to complement this school-based learning. These students will have the option of participating beyond these requirements for the research project.

The data sources for the research project will be: student and teacher observations, interviews, survey responses; assignments, tests, and related curriculum and zoo documents; and interviews with zoo personnel.

Specifically, student participation in the research involves the following:

1. Participating in two 15 minute interviews (one before and one after the unit of study).
2. Allowing the researcher to observe him/her participate in lessons in the classroom and during a zoo visit.
3. Allowing the researcher to use responses from a written survey (administered before and after the unit of study) to gain better understanding of his/her conservation-related understanding, attitudes, and actions.
4. Allowing the researcher to use his/her school work as evidence of his/her learning in this unit.

Agreement to your son/daughter’s participation will also allow for the use of an audio-recorder during the interviews, for the purpose of completing future written transcripts to be used in data analysis, if you are comfortable with this procedure.

By allowing your son/daughter to participate in the study, I will be able to consider his/her learning experiences in my exploration of how this particular unit of study affects secondary students’ conservation-related knowledge, attitude, and behaviour. There is no payment for participation in this study. The direct benefit for students participating in this study is having the opportunity to express their opinions on this particular teaching and learning experience. This study also hopes to enhance your son/daughter’s science education experience through the collaboration amongst the researcher, teacher, and zoo. In the future, this research may provide guidance for other educators, both in school and zoo settings, aiming to maximize conservation education outcomes for their students. The research also provides valuable information to educators and researchers on the merit of this zoo-school partnership in promoting conservation education, by examining the experience from both the teacher and students’ perspectives.
As part of the regular science instructional routine students will be expected to complete class assignments and tests for grading purposes, including a survey which will allow them to reflect on their personal conservation-related understanding, attitudes, and actions. Participating or contributing beyond these requirements in the research study is completely optional (i.e., participating in an interview; allowing me to consider the student’s learning experiences through their assignments and tests, survey and interview responses, and researcher observations); if parent/guardian permission for student participation is not granted, the student will not be asked to participate or contribute in these ways.

Participation in this study is completely voluntary and your son/daughter may withdraw from the study at any time and for any reason without negative consequences. Your son/daughter’s mark in the Grade 11 biology course will not be affected by your decision to allow him/her to participate or to not participate in the research. To avoid any conflict of interest between the teacher and the students, the teacher will not know which students are participating in the research study, only the researchers will have access to this information.

There is no obligation for your son/daughter to answer any interview or survey question or to participate in any aspect of this project. This study aims to be as non-intrusive to the regular routine of science instruction as possible, so there are no known or anticipated risks associated with your son/daughter’s participation in this research. The survey and interview questions seek to provide insight into the experiences of the student and are non-judgmental.

All personal data will be kept strictly confidential and all information will be coded so that your son/daughter’s name will not be associated with observational notes, school work, interview, or survey responses. Only the researchers will have access to this data. Pseudonyms will be used to protect the identity of the school board, school, teacher, and students in research reports, published articles, and/or public presentations based on this study. The audio and written data will be stored for five years in a secure location and will be destroyed after that time. Upon completion of the study, I will provide a summary report to the ----------- District School Board, to -------- High School, and to Mr. --------.

If you have any questions or concerns about your son/daughter’s participation in the study, you may contact the primary investigator, Jennifer Skinner-Winslow via email at: jskinner-winslow@oise.utoronto.ca; or the supervising professor, Dr. Erminia Pedretti at (416) 923-6641 x2527. If you would like more information on the rights of a participant in a research study you may also contact the University of Toronto’s Ethics Review Office at (416) 946-3273. In addition, you may also contact your son/daughter’s science teacher, Mr. --------, at ---------- High School.

Thank you very much for taking the time to consider this request.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate
Department of Curriculum, Teaching and Learning
OISE/University of Toronto
CONSENT FORM: PARENT/GUARDIAN AND STUDENT

If you and your son/daughter consent to his/her participation in this study, please sign below. Please also indicate if you and your son/daughter consent to having the interviews audio-recorded. Please keep the information letter for future reference and return only this page to the researcher, Jennifer Skinner-Winslow, or to your son/daughter’s science teacher, Mr. ------, sealed in the envelope provided.

Thank you very much for your help!

I (name of parent/guardian): ____________________________________________________________,
parent/guardian of (name of student): ___________________________________________________,
give permission for my son/daughter to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Parent/Guardian: ________________________________________________________
Date: ____________________________

Please check one:

☐ I also give permission for the interviews to be audio-recorded.
OR ☐ I do not give permission for the interviews to be audio-recorded.

I (name of student): ________________________________________________________________
give my consent to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Student: ______________________________________________________________
Date: ____________________________

Please check one:

☐ I also give permission for the interviews to be audio-recorded.
OR ☐ I do not give permission for the interviews to be audio-recorded.
INFORMED CONSENT LETTER: DEPARTMENT MANAGER, TORONTO ZOO

Title of Study: Zoos and Schools: Teaching and Learning about Conservation in Science Education

Researchers: J. Skinner-Winslow and Dr. E. Pedretti (Supervising Professor)

Dear ----------,

The purpose of this letter is to invite you and personnel from the Toronto Zoo to participate in a research study that I will be conducting in the near future.

As you are likely aware from previous correspondence, the purpose behind the research is to explore the experiences of teacher and students in using the zoo for teaching and learning about conservation in science education, as well as the role of the zoo. This study is both timely and appropriate, as it will allow us to better understand the experience of using the zoo to promote conservation in science education, at a time when promoting environmental literacy among students is of great importance.

The data sources for the research project will be: student, teacher, and zoo personnel observations and interviews; student and teacher survey responses; student assignments and tests; related curriculum and zoo documents. Members of the Toronto Zoo, including you, are invited to participate in a brief interview (approximately 20-30 minutes) which aims to explore the role of the zoo in educating students about conservation-related issues. Agreement to your participation will also allow for the use of an audio-recorder during the interviews, for the purpose of completing future written transcripts to be used in data analysis, if you are comfortable with this procedure. Explicit consent to such recording will also be sought from each individual zoo personnel member to ensure that they are fully comfortable with this procedure. In addition, I am seeking permission to observe zoo personnel as they deliver a Behind-the-Scenes tour and Zoos and Conservation presentation, with the teacher and students participating in the research study.

It is hoped that this research will be an opportunity for professional development for you and personnel from the Toronto Zoo, as well as an opportunity to reflect on your educational programs and missions. This research hopes to provide guidance for formal and informal educators aiming to maximize conservation education outcomes for their students in the future. The research also provides valuable information to educators and researchers on the merit of this zoo-school partnership in promoting conservation education, by examining the experience from both the teacher and students’ perspectives. There is no payment for participation in this study.

Participation in this study is completely voluntary and you and/or personnel from the Toronto Zoo may withdraw from the study at any time and for any reason without negative consequences. There is no obligation for you or personnel from the Toronto Zoo to answer any interview question or to participate in any aspect of this project. The interview questions seek to provide insight into the conservation education program of the Toronto Zoo and do not evaluate zoo personnel on a personal level. This study aims to be as non-intrusive to the regular routine of a Behind-the-Scenes tour and Zoos and Conservation presentation as possible, so there are no known or anticipated risks associated with participation in this research.

All personal data will be kept strictly confidential and all information will be coded so that names of personnel from the Toronto Zoo will not be associated with interview responses. Pseudonyms will be used to protect personal identities in research reports, published articles, and/or public presentations based on this study, however the consent form will give you the option of having the Toronto Zoo named in such public forums, if desired. The audio and written data will be stored for five years in a secure location and will be destroyed after that time. Upon completion of the study, I will provide a summary report to the Department Manager at the Toronto Zoo.
If you have any questions or concerns about your participation, or the participation of personnel from the Toronto Zoo in this study, you may contact the primary investigator, Jennifer Skinner-Winslow or the supervising professor, Dr. Erminia Pedretti at (416) 923-6641 x2527. If you would like more information on the rights of a participant in a research study you may also contact the University of Toronto’s Ethics Review Office at (416) 946-3273.

Thank you very much for taking the time to consider this request.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate
OISE/University of Toronto
Department of Curriculum, Teaching and Learning
CONSENT FORM: DEPARTMENT MANAGER, TORONTO ZOO

If you consent to your participation and/or the participation personnel from the Toronto Zoo in this study, please sign below. Please also indicate if you consent to having the interviews audio-recorded in each case. In addition, please indicate the Toronto Zoo’s preference for being named in future public forums. Please keep the information letter for future reference and return only this page to the researcher, Jennifer Skinner-Winslow. Thank you very much for your help!

I (name of Department Manager at the Toronto Zoo): __________________________________________, give my personal consent to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Manager at the Toronto Zoo: __________________________________________

Date: __________________________

Please check one:

☐ I also give permission for my personal interview to be audio-recorded.

OR

☐ I do not give permission for my personal interview to be audio-recorded.

As Department Manager at the Toronto Zoo, I (name of Department Manager at the Toronto Zoo):

__________________________________________, give permission for personnel from the Toronto Zoo to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Manager at the Toronto Zoo: __________________________________________

Date: __________________________

Please check one:

☐ I also give permission for these interviews to be audio-recorded.

OR

☐ I do not give permission for these interviews to be audio-recorded.

Please check one:

☐ The Toronto Zoo would like to be explicitly named in research reports, published articles, and/or public presentations based on this study.

OR

☐ The Toronto Zoo would not like to be explicitly named in research reports, published articles, and/or public presentations based on this study.
INFORMED CONSENT LETTER: ZOO PERSONNEL

Title of Study: Zoos and Schools: Teaching and Learning about Conservation in Science Education

Researchers: J. Skinner-Winslow and Dr. E. Pedretti (Supervising Professor)

Dear Toronto Zoo Personnel,

I would like to begin this letter by introducing myself. My name is Jennifer Skinner-Winslow and I am currently a second year Ph.D. student at the Ontario Institute for Studies in Education at the University of Toronto. Prior to beginning this program of study, I was an intermediate science teacher for five years.

The purpose of this letter is to ask for your permission to participate in a research study that I will be conducting in the near future.

The purpose behind the research is to explore the experiences of teacher and students in using the zoo for teaching and learning about conservation in science education, as well as the role of the zoo. This study is both timely and appropriate, as it will allow us to better understand the experience of using the zoo to promote conservation in science education, at a time when promoting environmental literacy among students is of great importance.

The data sources for the research project will be: student and teacher observations, interviews, survey responses; assignments, tests, and related curriculum and zoo documents; and interviews with zoo personnel. As a member of the Toronto Zoo you are invited to participate in a brief interview (approximately 20 minutes) which aims to explore the role of the zoo in educating students about conservation-related issues. Agreement to your participation will also allow for the use of an audio-recorder during the interviews, for the purpose of completing future written transcripts to be used in data analysis, if you are comfortable with this procedure.

It is hoped that this research will be an opportunity for your own professional development, as well as an opportunity to reflect on the Toronto Zoo’s educational programs and missions. This research hopes to provide guidance for formal and informal educators aiming to maximize conservation education outcomes for their students in the future. The research also provides valuable information to educators and researchers on the merit of this zoo-school partnership in promoting conservation education, by examining the experience from both the teacher and students’ perspectives. There is no payment for participation in this study.

Participation in this study is completely voluntary and you may withdraw from the study at any time and for any reason without negative consequences. There is no obligation for you to answer any interview question. The interview questions seek to provide insight into the conservation education program of the Toronto Zoo and do not evaluate zoo personnel on a personal level. Therefore, there are no known or anticipated risks associated with your participation in this research.

All personal data will be kept strictly confidential and all information will be coded so that your name will not be associated with interview responses. Although the Toronto Zoo may be named, a pseudonym will be used to protect your personal identity in research reports, published articles, and/or public presentations based on this study. The audio and written data will be stored for five years in a secure location and will be destroyed after that time. Upon completion of the study, I will provide a summary report to the Department Manager at the Toronto Zoo.
If you have any questions or concerns about your participation in the study, you may contact the primary investigator, Jennifer Skinner-Winslow via e-mail at jskinner-winslow@oise.utoronto.ca or the supervising professor, Dr. Erminia Pedretti at (416) 923-6641 x2527. If you would like more information on the rights of a participant in a research study you may also contact the University of Toronto’s Ethics Review Office at (416) 946-3273.

Thank you very much for taking the time to consider this request.

Sincerely,

Jennifer Skinner-Winslow
Ph.D. Candidate
OISE/University of Toronto
Department of Curriculum, Teaching and Learning
CONSENT FORM: ZOO PERSONNEL

If you consent to participating in this study, please sign below. Please also indicate if you consent to having the interviews audio-recorded. Please keep the information letter for future reference and return only this page to the researcher, Jennifer Skinner-Winslow.

Thank you very much for your help!

I (name of zoo personnel):__________________________________________________________, give
my consent to participate in the research study entitled Zoos and Schools: Teaching and Learning about Conservation in Science Education, as described in the attached information letter. The project has been explained and I have had the opportunity to ask questions.

Signature of Zoo Personnel: ______________________________________________________

Date: ____________________________

Please check one:

☐ I also give permission for the interviews to be audio-recorded.

OR  ☐ I do not give permission for the interviews to be audio-recorded.
Appendix C: Zoos and Conserving Biodiversity Unit Overview and Sample Lessons

Pre-Zoo Visit

1. **Student/Teacher Individual Interviews:**
   - 10-15 mins

2. **Student/Teacher Survey:**
   - 10-15 mins
   - Purpose is to help students and teacher reflect on their current knowledge and views about zoos and conservation

3. **Reading #1: Biodiversity Basics:**
   - From WWF’s *Biodiversity 911* Web site
   - Students to complete follow-up questions (in class and/or at home)
   - Students to submit answers to questions for grading and/or research purposes

4. **Teacher Zoos and Misperceptions Presentation:**
   - Purpose is to expose students to alternate ways of thinking about zoos

5. **Intro to Major Project:**
   - Distribute major project handout and show resources/sample products/etc.
   - Ask students to choose their group of 2-3 (or may work alone if they prefer), choose their conservation-related issue/initiative topic and format
   - Aim is to encourage action-oriented outcomes

6. **Teacher Introduction to Toronto Zoo Presentation:**
   - Purpose is to help orient students to the Toronto Zoo and its Web site

7. **Internet Search on North American Zoos:**
   - Based on *Zoos and Conservation* activity from *ZooAction!* Web site
   - Students work in groups of 3-4 to research information on a North American Zoo for worksheet
   - Students share findings with whole class
   - Students to submit worksheet for grading and/or research purposes
   - Purpose is to help students become more knowledgeable about zoos and conservation and to expose students to alternate ways of thinking about zoos

8. **Review of Zoo trip:**
   - Teacher reviews zoo trip plans and invites questions
   - Students will be asked if they have decided on their topic and format for the major project (this is flexible, as they may choose to change their topic during/after zoo visit)
During-Zoo Visit

9. Zoos and Conservation presentation:
   • Meet in Education Building at 10am
   • Approx. 35 mins. Zoos and Conservation presentation delivered by zoo personnel, geared
     to high school students
   • Students to take notes relevant to their major project

10. Unstructured time to explore the zoo:
    • Students to take notes for their major project as they tour the zoo on their own in small
      groups (10:35 am - 12:45pm)

11. Guided tour and Behind-the-Scenes tour:
    • Students meet at Education Building at 12:45pm for guided tours (1pm - 3 pm)
    • Students pre-divided into 4 groups (Logan’s class formed one group)
    • Each class led on a tour of a section of the zoo by a zoo volunteer
    • Behind-the-scenes tour of one of the following holding areas: Bactrian Camel, White
      Rhino (Logan’s group), Amazon Holding (at risk Native reptiles), Hyenas
    • Behind-the-scenes tour of the zoo’s Animal Nutrition Centre
    • Students asked to take notes relevant to their major project

Post-Zoo Visit

12. Preparing Major Project:
    • Share project resources with students and finalize topics; debrief zoo visit, particularly as
      it relates to major project
    • Students to research their topic (at school and home)
    • Students to prepare final product (at school and home)

13. Reading #2: Conservation Techniques and Reading #3: Zoos and Captive Breeding:
    • From WWF Web site
    • Divide the class into two groups to read one of the two articles and then share their
      reading with the other group

14. Zoo Diaries Video:
    • Show students a sample of the Zoo Diaries videos
    • Purpose is to help students become more knowledgeable about what modern zoos do and
      to expose students to alternate ways of thinking about zoos
15. Dilemma Cards:
- Based on *Ethi-Reasoning* activity (pp. 342-343) from *Project Wild*
- Have students work in small groups to share and discuss ethical dilemmas related to zoos and/or conservation
- Purpose is to help students reflect on their own current knowledge and views about zoos and conservation, and to stimulate dialogue; and to expose students to alternate ways of thinking about zoos

16. Student Action/Class Presentations:
- Students follow through with their conservation-related action component in school or alternate setting if desired (permission from teacher must be obtained first)
- Students share final product with class, so that all students are informed of each other’s topics
- Students to submit final product for grading and for research purposes

Post-Unit of Study

17. Student/Teacher Survey:
- 10-15 mins
- Purpose is to help students and teacher reflect on their current knowledge and views about zoos and conservation and any changes which may have occurred over the unit of study

18. Student/Teacher Individual Interviews:
- 10-15 mins
Zoos and Conserving Biodiversity Unit
Lesson Plan: Dilemma Card Activity

Teacher Information

Curriculum Connections
Gr. 10 Science, Academic/Applied, Biology unit, Ecosystems
Gr. 11 Biology, Academic/Applied, Diversity of Living Things/Environmental units

This activity is based on the Ethi-Reasoning activity found in Project Wild (pp. 340-344). Some dilemmas used in the dilemma cards came directly from the Ethi-Reasoning activity and others were based on current issues found on the World Wildlife Federation (WWF) Web Site, Canadian Association of Zoos and Aquariums (CAZA) Web Site, and Philadelphia Zoo’s Web Site.

The dilemma card activity was modified specifically for use in the Zoos and Conserving Biodiversity unit of study done with a Gr. 11 Academic Biology class, which took a Science, Technology, Society and Environment (STSE) approach to the Diversity of Living Things strand.

Objectives
• To allow students to become more knowledgeable about current conservation issues from a variety of perspectives
• To provide a chance for students to think critically, examine their own values and beliefs, and formulate their own opinions
• To encourage the sharing of opinions, thoughts, and ideas through dialogue in small groups and in whole class discussions

PART I – Small Group Discussion
Divide students into small groups of 3-4. Distribute one complete set of dilemma cards per group (i.e., 10 cards). For each card, have students decide which option they personally think is the best choice and why. As a group, have the students try to reach consensus on a SINGLE best option for the whole group. In this way, students will be encouraged to discuss their opinions and their rationale for each choice. Have students fill in the worksheet chart as they go along.

PART II – Whole Class Discussion
Ask each group to share with the rest of the class some of their opinions/decisions, (particularly dilemma cards which were categorized as DISAGREE and UNSURE) and why. Allow for this sharing to develop into whole class discussions by inviting members in other groups to comment as well.
References

Canada's Accredited Zoos and Aquariums (CAZA) Web Site: *http://www.caza.ca/

Philadelphia Zoo Web Site: *www.philadelphiazoo.org*

Toronto Zoo Web Site: *www.torontozoo.com*

World Wildlife Federation (WWF) Web Site: *www.panda.org*
Dilemma Cards
Copy and cut dilemma cards into separate pieces of paper; store each set separately in a small envelope. Make one set per group.

Dilemma Card 1: Saiga Antelope
You are enjoying a visit to Central Asia. During your trip you make an unfortunate discovery – saiga antelope horns are being sold on the illegal market. You know that the saiga antelope population is drastically declining in this area, primarily due to overhunting, and that this trade is illegal. Should you:
1. purchase one;
2. do nothing;
3. notify local authorities and/or authorities in Canada upon your return home; or
4. other (explain).

Dilemma Card 2: Wood Bison
You are head of a task force created to select the best course of action to attempt to preserve the Wood Bison. Some members of your task force would like you to authorize capturing some of the Wood Bison and sending them to zoos to try to propagate them in captivity. Should you:
1. leave all of them in their natural environment;
2. capture some of them for zoos;
3. launch an education campaign about causes of endangerment of the Wood Bison; or
4. other (explain).

Dilemma Card 3: Lions
You are the chief warden of a national wildlife reserve in Kenya. Lions, whose numbers in the wild are declining rapidly, are becoming pests for local ranchers. While the ranchers are trying to make a living by raising livestock, the lions are roaming beyond the borders of the reserve to hunt these livestock. This conflict has led to the killing of lions through the use of guns and poisons, in order to protect the ranchers’ homes and livestock. Should you:
1. encourage local ranchers to continue killing lions as needed;
2. try to prevent future conflict by increasing the time spent monitoring lions by your current game reserve staff;
3. accept support from a large American zoo, willing to provide additional staff, researchers, and equipment to help find a solution; or
4. other (explain).

Dilemma Card 4: Bluefin Tuna
You are the captain of several Spanish fleets which regularly fish for Bluefin tuna. Your catches are down to 15% of what they were a decade ago. You know that the wild Bluefin tuna population has declined in the area, and feel that a collapse of the species is possible if conservation measures are not taken (for example, reducing the fishing of Bluefin tuna in the wild, and breeding them in captivity). On the other hand, you are also aware that your own livelihood and the livelihood of the fishermen you employ depend upon your sending out fleets to fish for large catches. Should you:
1. continue fishing as much as possible;
2. cease operation altogether;
3. follow the recommendations of conservationists and reduce your catches; or
4. other (explain).
### Dilemma Card 5: Beluga Whales
You are a member of Canada's Accredited Zoos and Aquariums (CAZA). You have been asked to provide your stance on the desire of a Canadian aquarium to acquire beluga whales. An animal activist group has repeatedly demonstrated their belief that cetaceans (dolphins, porpoises, whales) should not be kept in captivity, under any circumstances. You know that this aquarium seeks to acquire these whales for conservation, education, and entertainment purposes. Should you:
- 1. state that all cetaceans should be left in their natural environment;
- 2. state that keeping some cetaceans in captivity is acceptable, as long as CAZA’s policies for animal acquisition and care are strictly followed;
- 3. make no statement at this time; or
- 4. other (explain).

### Dilemma Card 6: Snow Leopard Pelts
You are a judge in a case where a man has been charged with killing snow leopards to sell their pelts in the illegal wildlife market. He has been unemployed and had planned to use this money to feed his family. You know that snow leopards are a highly endangered species protected under international law. Should you:
- 1. give him the maximum punishment and put him in prison;
- 2. fine him;
- 3. release him with a warning; or
- 4. other (explain).

### Dilemma Card 7: Mediterranean Sea
You are an influential government official in a popular tourist area along the Mediterranean Sea. You know it is one of the world’s leading tourist destinations – which is good, economically, for the people who live there. You are also aware that mass tourism is one of the main causes of damage to the environment in that region. Marine turtles, for example, have been badly affected by the destruction of their nesting sites. Should you:
- 1. support mass development for tourist needs (hotels, roads, etc.);
- 2. support the preservation of all remaining natural areas;
- 3. support development in some areas and not others; or
- 4. other (explain).

### Dilemma Card 8: Bald Eagle Nest
You have purchased a beautiful property in the mountains to build a summer home. One hillside of the property has a beautiful view of the valley and lake below and is your choice for your homesite. However, you discover there is an active bald eagle nest site on that hillside. The bald eagle is sensitive to disturbance around its nest tree and is a protected species. Bald eagles are highly selective in choosing nest sites and usually return to the same nest year after year. Should you:
- 1. select a different site on the property to build your home;
- 2. sell the property;
- 3. chop down the tree and build your home; or
- 4. other (explain).
<table>
<thead>
<tr>
<th>Dilemma Card 9: TEK</th>
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<tbody>
<tr>
<td>You are a local government official in the Arctic region of eastern Russia. The native people are witnessing changes taking place in the wild which they believe are a result of a warming climate, and they want you to do something about it. For example, they have observed that walruses, which usually spend most of their time on sea ice have been forced to come ashore due to the melting of the sea ice. Should you:</td>
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<td>1. act immediately on the Traditional Ecological Knowledge (TEK) provided by the native people, whose connection to this environment is so close;</td>
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<td>2. before acting, hire an external scientist to conduct research to confirm or deny the natives’ observations;</td>
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<td>3. do nothing at this time; or</td>
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<td>4. other (explain).</td>
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<th>Dilemma Card 10: A New Zoo?</th>
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<td>You are an active member of your community involved in a town hall debate on the building of a new zoo. The biggest issue surrounding this new zoo is the keeping of animals in captivity. Some community members feel strongly against zoos because they do not believe that animals should be kept in captivity, for any reason. Some community members feel strongly for zoos because they are aware of the potential good which can come from keeping animals in captivity, such as breeding endangered animals in an attempt to prevent their extinction. Should you:</td>
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<td>1. argue against the zoo;</td>
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<td>2. argue for the zoo;</td>
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<td>3. do your own research to better understand the roles of zoos in conservation before voicing your opinion; or</td>
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<td>4. other (explain).</td>
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Zoos and Conserving Biodiversity Unit
Dilemma Card Activity

Student Worksheet

Student Name:
Group Members’ Names:
Date:

PART I: Small Group Discussion
Divide into small groups of 3-4.

For each card, decide which option you personally think is the best choice. Share this with the rest of the group and see if your group can agree on ONE option which is best for the whole group.

Fill in the chart below as you go along. Note if the group ALL AGREES, DISAGREES, or is UNSURE of the option you think is best and why you have reached this decision.

<table>
<thead>
<tr>
<th>Dilemma Card</th>
<th>Your Best Option</th>
<th>Group: ALL AGREE/DISAGREE/ or UNSURE</th>
<th>Why? (Use the back of this sheet if more space is needed)</th>
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PART II: Whole Class Discussion
Be prepared to discuss your groups’ opinions/decisions with the whole class.
Zoos and Conserving Biodiversity
Lesson Plan: Major Project

Teacher Information

Objectives
• To encourage students to become better informed about conservation-related issues and initiatives associated with a modern zoo
• To promote positive conservation-related action among students

PART I – Getting Started
Divide students into small groups of 1-3 students per group. Each group chooses a conserving biodiversity issue or initiative that is currently associated with the Toronto Zoo. Each group chooses a format for presenting their project information, which should include an element of conservation-related action. You may want to provide students with an opportunity to review the topic options on the Internet before deciding. It is recommended that each group chooses a different topic, so as to maximize learning (and minimize repetition) during whole class presentations.

Due to the nature of this assignment, students will be asked to inform the teacher of their choice of topic and format before starting their project to ensure its suitability / appropriateness.

Encourage students to review the assessment criteria before starting project.

PART II – School- and Home-Based Research
Students carry out research at home and at school on their chosen topic.

PART III – Zoo-Based Research
Students are responsible for taking field notes and asking questions relevant to their chosen topic while participating in zoo visit activities (i.e., Zoos and Conservation presentation, Behind-the-scenes tour, and/or unstructured exploration time). Students may be encouraged to take pictures and/or video at the zoo to incorporate into their final project.

PART IV – Group Action / Presentations
Once the final products have been reviewed by the teacher, students will be encouraged to follow through with their intended plan of action. Each group will share their final product with the class, so that all students are informed of each other’s topics and actions.
Zoos and Conserving Biodiversity Unit
Major Project

Student Information

_Student Name:_

_Group Members' Names:_

_Date:_

PART I: Getting Started
Divide into small groups of 2-3 (or work alone if you prefer). As a group, choose one topic and one format for the project from the lists provided. Carefully read over the assessment criteria checklist provided before starting the project.

PART II – School- and Home-Based Research
Make a plan for how/what research will be carried out at home and at school on your group’s chosen topic. Some useful references have been provided - keep careful record of which references your group uses!

PART III – Zoo-Based Research
Each student is responsible for taking field notes and asking questions relevant to the group’s chosen topic while participating in zoo visit activities (i.e., Zoos and Conservation presentation, Behind-the-scenes tour, and/or unstructured exploration time). Your group may also want to take photos/video at the zoo for the final product.

PART IV – Group Action / Presentations
Once the final product is completed, ask your teacher to review it BEFORE following through with your intended plan of action. Prepare a presentation to share your project with the class.

Some Useful References
- Canada’s Accredited Zoos and Aquariums: [www.caza.ca](http://www.caza.ca)
- American Zoo and Aquarium Association: [www.aza.org](http://www.aza.org)
- Other zoo web sites (such as those provided in the Internet Search Activity)
- The David Suzuki Foundation: [http://www.davidsuzuki.org](http://www.davidsuzuki.org)
Possible Topics (Choose ONE topic from the list below.)

Zoo Species Conservation

- May focus on conservation efforts for one or more related species such as:
  - Mammals (such as the Black Footed Ferret, Vancouver Island Marmot): [http://www.torontozoo.com/Conservation/mammals.asp](http://www.torontozoo.com/Conservation/mammals.asp)
- Additional info may be found on zoo animal fact sheets: [http://www.torontozoo.com/Animals/](http://www.torontozoo.com/Animals/)

Zoo Research

- Species Survival Plans (SSPs), Studbooks, TAG’s, SAG’s for one or more species: [http://www.torontozoo.com/AboutTheZoo/Affiliations.Collaborations.asp](http://www.torontozoo.com/AboutTheZoo/Affiliations.Collaborations.asp)

Eco-Zone Protection/Restoration


Affiliated External Conservation Efforts


Other

- Some other conservation issue/initiative associated with the Toronto Zoo of the students’ choice, which must first be approved by the teacher
Possible Formats (Choose ONE format from the list below.)

Educate Zoo Visitors

- Might include: a children’s book, brochure, placemat, poster, Web site, etc.
- Prepared for adults, families, other school groups, etc. visiting the zoo
- Students are encouraged to contact the zoo to see if they are interested in actually using their project to educate visitors

Educate Others at School

- Might include: presentation, brochure, video, newsletter, poster, Web site, etc.
- Prepared for teachers, administrators, students, etc.

Write a Submission Piece

- Might include: an opinion letter, discussion paper, research report, newspaper or magazine article, etc.
- Prepared for a real person/organization: magazine or newspaper editor, politician, zoo/aquarium, school newspaper, etc.
- See for example:
  - Tips and direct links to newspapers, politicians, etc. on The David Suzuki Foundation / Take Action Web site: [http://www.davidsuzuki.org/Take_Action/](http://www.davidsuzuki.org/Take_Action/)
  - Sierra Club of Canada / Comment: [http://www.sierraclub.ca/national/media/comment/index.html](http://www.sierraclub.ca/national/media/comment/index.html)
  - WWF / Tips and Toolkit (for tips on letter writing, etc.): [http://passport.panda.org/about/toolkit.cfm?uNC=52968490](http://passport.panda.org/about/toolkit.cfm?uNC=52968490)

Organize a Fundraiser

- Might include: bake sales, BBQ, etc.
- Prepared for teachers, administrators, students, etc. at school
- To raise funds for a cause/organization related to your issue/initiative, such as:
  - WWF: [http://www.panda.org/how_you_can_help/donate/index.cfm](http://www.panda.org/how_you_can_help/donate/index.cfm)

Other

- Some other action-oriented format of the students’ choice, which must first be approved by the teacher
Assessment Criteria Checklist
(Check off boxes as completed and hand in checklist with your project after your group’s
class presentation.)

Student Name:  
Group Members’ Names:  
Date:  

Project Content

☐ Did you answer as many of these content questions as possible?  
(Note: try to include your answers somewhere in the final product. If some questions can
not be easily integrated into your chosen format, submit the answers separately on a
piece of a paper when you hand in your project and checklist.)
☐ What is your conservation initiative/issue? What problem does it address?
☐ How is it important to the overall goal of conserving biodiversity and/or species survival?
☐ How, if at all, does this conservation-related problem affect humans?
☐ Why is this issue/initiative important to you and/or your group? Why did you choose it?
☐ How is this conservation initiative/issue associated with the Toronto Zoo and, if applicable,
what is being done about this initiative/issue at the Toronto Zoo?
☐ What is being done about this issue/initiative outside the Toronto Zoo (i.e., by other zoos
and/or by other conservation organizations like WWF)?
☐ How successful have these efforts been? How do you know this?
☐ What can the “average” person do to help this issue/initiative?
☐ Is there anything else that you think could be done for this issue/initiative that is not already
being done?
☐ Was scientific research/knowledge used to back up your ideas/opinions?
☐ Did you provide adequate references?
☐ Did you communicate your ideas effectively for the format / audience chosen?

Group Action

☐ Did your group make a genuine effort to take positive action related to your conservation
issue/initiative?
☐ Were your group’s action-related goals met? (If not, please explain.)

Group Presentation

☐ Did you share the answers to the above content questions in your group presentation?
☐ Did you share your group’s plan of action in your presentation?
☐ Did your group deliver an effective class presentation?
**Zoos and Conserving Biodiversity Unit**  
**Major Project**

**Student Action Plan Checklist**

*Group Members’ Names:*

*Date:*

*THIS FORM IS DUE BACK BY:*

- What exactly is your action plan? (e.g., organizing a bake sale to raise funds for the Toronto Zoo Adopt-An-Animal program)

- What goal(s) do you hope to achieve? (e.g., to raise at least $25 to Adopt-An-Animal and to raise awareness about conserving mammal biodiversity at my school)

- Who is your target audience? (e.g., a Grade 2 class)

- If applicable, what “product(s)” will you be sharing? (e.g., a poster) Is it appropriate for the target audience? (yes/no, if no what can you do to change it?)

- Where will you be carrying out your action plan? (e.g., at a certain elementary school)

- Who do you need to contact/obtain permission from to carry out your action plan? (e.g., the Grade 2 teacher)

- How do you plan to obtain permission from this person/people? (e.g., write a letter to the elementary school to explain our project and to ask permission to present to the Grade 2 class)
If you are leaving High School have you received official permission and brought in a signed note from your parent/guardian to Mr. ------? (yes/no, if no, when will you be doing so?)

If you are leaving High School how will you get to where you need to go? (Remember that school policy is that students are not allowed to drive other students!)

What resources/equipment do you need to carry out your action plan? (e.g., an overhead projector) Where will you get these resources/equipment from?

If applicable, what are the costs associated with carrying out the plan? Who will pay for what?

What is left to do before carrying out your plan? Who will do each of these things in your group?

When does your group expect to:
   a. contact person/people involved?__________________________________
   b. carry out the plan? ___________________________________________
   c. report back to Mr. --------? _____________________________________

Has Mr. -------- approved your action plan?
   a. Mr. --------’s signature: _________________________________________
   b. Date: _______________________________________________________

GOOD LUCK WITH YOUR ACTION PLAN!
Appendix D: Sample Field Note Entries
(Excerpt from Field Note #4, pp. 1-8, names and other identifiers blocked)
What does zoo do for education?
- guided tours, etc.
- presents
- classes
- we don't go on a field trip just for fun .... there's a change in the board that there should be an educational component.
- some schools go in 6th 10, but I like going in 3rd 4th you often get students who are more interested in bird, if you get more interesting classes I like going again and again and I learn something new every time.
- animals are even different from season to season (less active in summer)
- it also does visits to schools etc.

What does zoo do for conservati?
- SSP for endangered species
- you might want to contact zoo if there's for your big project
- research: zookeepers, etc.
- public awareness / education:
  - volunteer
  - adopt an animal
  - show students some pic
  - how important it is to read the signs - taught the koyal cat who was an exotic pet - why it is not a good idea to have as a pet
  - another ex:orted the alligator
  - strike - didn't get along with male - this is why he is in solitary enclosure
- Educating the Young
- CSI kids exhibits - KidZone
- Touch house
- Prairie dog exhibit
- Lot of little signs
- Poems, pics on signs for young kids
- Touch & feel area + touching with deers
- Should we harvest bear fur? - Think about it
  - They need it for survival
  - There is a lot of respect for the animal
  - There is a program when we can buy fur

- Hunting - Ministry wants deer population
  - Deer population - there are not a lot of natural predators
  - Deer can starve over winter
  - They allow some deer to be hunted, rather than have them starve

- Lot of info - kid friendly
  - (ex. animal families program)
  - In American pavilion - clear cutting prob - relates it back to biodiversity ass't given earlier in the week
  - Once clear cutted, you have more acorns
    - Some places would eat their meat from other countries, but it is cheaper
  - We need trees to build homes - but how do we do it? Choose certain trees & leave others
  - In Canada, we're NA

Much better - you can see trees from the highway but clear cut in other areas
- Try to inspire you to change
- It's a frog's life
- How to keep frogs in your
- tank
- Lots of information. Let me
- see a state circular animal
- I've seen past the signs,
- try to take time at first's
- trip to read the signs!
- Let's try to take pick a sign
- and read them later
- at home
- Lots of things the Toronto Zoo
- is involved in
- Let's spend a lot of time
- talking about the major
- project
Appendix E: Interview Protocols

Interview Protocol: Teacher/Before Unit of Study

Demographic/Background Questions:
1. What are your educational qualifications?
2. How long have you been teaching?
3. How long have you been teaching secondary school science specifically?
4. How long have you been teaching at this school?
5. What is your official position at the school?

Focal Questions (Professional):
6. How often would you say you bring your science students to the zoo?
7. What groups of students/classes do you usually take to the zoo?
8. What is/are your reason(s) for bringing them to the zoo?
9. How, if at all, did these trips relate to the specific goal of teaching about conservation?
10. What, if anything, have you observed on previous field trips to the zoo which indicate that the zoo has been successful in teaching students about conservation?
11. What has been the nature of the collaboration between yourself and the zoo?
12. What do you hope to achieve with your students by taking them to the zoo this year, with regards to educating them about conservation-related knowledge, attitude, and actions? In other words, how do you think the zoo visit will help students learn about conservation?
13. In general, what are your views on teaching about conservation in science education?
14. What are your views on this particular unit of study on conserving biodiversity and zoos?
15. What do you hope to achieve with your students in this unit of study on conserving biodiversity, with regards to knowledge, attitude, and/or action?
16. Is there anything else that you think I should know about your efforts to teach about conservation in the classroom or at the zoo?

Focal Questions (Personal):
17. On a scale of 1-5, 5 being most knowledgeable and 1 being least knowledgeable, how knowledgeable do you think you are when it comes to conserving/protecting biodiversity/wildlife? Why do you think this?
19. What (if anything) do you do to conserve/protect biodiversity/wildlife at home/school/etc.? Can you give any specific examples?
20. Do you think conserving wildlife biodiversity is important? Why or why not?
21. Do you think conserving wildlife biodiversity is straightforward from person to person, culture to culture? Explain.

22. (a) What do you enjoy most about visiting the zoo? Why?
(b) What do you enjoy least about visiting the zoo? Why?
(c) What would you say was the most important/memorable thing(s) that you personally learned at the zoo?

23. How do you feel about zoos in general? Why?

24. (a) What do you know about what zoos do/their missions?
(b) What do you know about zoos’ conservation efforts specifically?
(c) How did you come to know this?
(d) Do you think zoos do a good job at achieving these missions? Why or why not?
(e) Do you think zoos do enough to conserve wildlife? Why or why not?


27. Has a zoo ever affected what you do about conserving/protecting wildlife? If yes, please explain.

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Interview Protocol: Teacher/After Unit of Study

Focal Questions Part 1: Professional / Zoo trip focus:
1. (a) Do you believe the zoo trip affected what the students know or understand about conservation? Please explain.
   (b) Do you believe the zoo trip affected their attitudes toward conservation? Please explain.
   (c) Do you believe the zoo trip affected what they do toward helping conservation action? Please explain.
2. (a) Do you feel your learning goals for the students were met on the zoo trip?
   (b) What, if anything, did you observe which indicated success/failure?
3. What are your views on the “zoos and conservation” presentation? What do you think students learned from it?
4. What are your views on the “behind-the-scenes” tour- rhino exhibit? What do you think students learned from it?
5. What are your views on the “behind-the-scenes” tour- animal nutrition centre? What do you think students learned from it?
6. What are your views on the “behind-the-scenes” tour- guided tour through some of the pavilions? What do you think students learned from it?
7. What are your views on the unstructured time given to the students to explore the zoo? What do you think students learned from it?
8. Overall, what would you say was the most important/memorable thing your students learned during the class trip to the zoo?
9. (a) What was the collaborative experience between yourself and the zoo like?
    (b) Did you feel like they adequately met your needs as a secondary school teacher?
    (c) Is there anything else they could do to make your school trips to the zoo more meaningful?
10. Do you think you will continue to bring your science students to the zoo? Does it have anything to do with your perceived success/failure of our trip this year?
11. What groups of students/classes will you likely take to the zoo in the future?
12. What will your educational goals be when you bring them to the zoo?
13. Is there anything that you would change for future zoo trips?
14. Is there anything else that you think could be done by the Toronto Zoo to enhance the promotion of conservation education for school groups visiting the Toronto Zoo?
15. Is there anything else that you think I should know about your experience with teaching this group about conservation at the zoo?
Focal Questions Part 2: Professional / Classroom focus:
16. (a) Do you believe the Biodiversity unit affected what the students know or understand about conservation? Please explain.
   (b) Do you believe the Biodiversity unit affected their attitudes toward conservation? Please explain.
   (c) Do you believe the Biodiversity unit affected what they do toward helping conservation action? Please explain.
17. (a) Do you feel your learning goals for the students were met during the Biodiversity unit?
   (b) What, if anything, did you observe which indicated success/failure?
18. What are your views on your “Zoos and Misperceptions” presentation as a teaching tool? What do you think students learned from it?
19. What are your views on the “dilemma card” assignment as a teaching tool? What do you think students learned from it?
20. What are your views on the “Zoo Diaries” video as a teaching tool? What do you think students learned from it?
21. (a) What are your views on the major project as a teaching tool?
   (b) What about the action component specifically?
   (c) What did you think students learned from it?
22. Why do you think some of the students’ action goals were not attained?
23. (a) Would you like to continue to do action projects in science? Why or why not?
   (b) If you were to do this particular action project again what, if anything, would you do differently?
24. Overall, what would you say was the most important/memorable thing your students learned during the Biodiversity unit?
25. Do you feel that both the positive and negative sides of zoos were fairly presented to the students through this unit of study?
26. What was the collaborative experience between yourself and the researcher like for you?
27. (a) Overall, what are your views on this particular Biodiversity unit of study?
   (b) What were some of the challenges you faced in the unit?
   (c) What were some of the rewards you gained in the unit?
   (d) Would you do it again?
   (e) If so, would you do anything differently next time?
28. Is there anything else that you think I should know about your experience with teaching the Biodiversity unit?
Focal Questions Part 3: Personal:

29. (a) On a scale of 1-5, 5 being most knowledgeable and 1 being least knowledgeable, how knowledgeable do you think you are when it comes to conservation? Why do you think this?
(b) How, if at all, did the Biodiversity unit and/or the zoo trip specifically, affect what you know or understand about conservation? Can you give an example?

30. (a) How do you feel/care about conserving/protecting biodiversity/wildlife? Why?
(b) How, if at all, did the Biodiversity unit and/or the zoo trip specifically affect your attitude toward conservation? Can you give an example?

31. (a) What do you do about conservation at home/school/etc.? Can you give any specific examples?
(b) How, if at all, did the Biodiversity unit affect what you do about conservation? Can you give an example?
(c) In the future, do you think you will take action on conservation issues?

32. Do you think conserving wildlife biodiversity is important to humans in general? Why or why not?

33. Do you think conserving wildlife biodiversity is straightforward from person to person, culture to culture? Explain.

34. (a) How do you feel about zoos in general? Why?
(b) Has this changed since before our unit of study and the zoo trip?

35. (a) What do you know about what zoos do/their missions?
(b) What do you know about zoos’ conservation efforts specifically?
(c) How did you come to know this?
(d) Do you think zoos do a good job at achieving these missions? Why or why not?
(e) Do you think zoos do enough to conserve wildlife? Why or why not?

36. What did you personally gain from the zoo trip this year?

37. What would you say was the most important/memorable thing(s) that you personally learned in this unit of study and/or at the zoo?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Interview Protocol: Student/Before Unit of Study

Demographic/Background Questions:
1. What is your age and date of birth?
2. Male/Female?
3. Have you taken the Grade 11 Biology course before?
4. How many times have you been to the Toronto Zoo? How many were school trips?
5. Have you been to any other zoo(s)? Which one(s)? Approx. how many times? Were any of these school trips?
6. Do you belong to any groups/organizations which support/focus on nature/wildlife/conservation/ the environment?

Focal Questions:
7. On a scale of 1-5, 5 being most knowledgeable and 1 being least knowledgeable, how knowledgeable do you think you are when it comes to conserving/protecting biodiversity/wildlife? Why do you think this?
8. How do you feel/care about conserving/protecting biodiversity/wildlife? Why?
9. What (if anything) do you do to conserve/protect biodiversity/wildlife at home or at school? Can you give any specific examples?
10. Do you think conserving wildlife biodiversity is important? Why or why not?
11. What would you say was the most important/memorable thing(s) you learned about conserving biodiversity/wildlife in school?
12. If student has been to a zoo before:
   (a) What do you enjoy most about visiting the zoo? Why?
   (b) What do you enjoy least about visiting the zoo? Why?
   (c) What was the most important/memorable thing(s) that you learned at the zoo?
13. How do you feel about zoos in general? Why?
14. (a) What do you know about what zoos do/their missions?
   (b) What do you know about zoos' conservation efforts specifically?
   (c) How did you come to know this?
   (d) Do you think zoos do a good job at achieving these missions? Why/why not?
   (e) Do you think zoos do enough to conserve wildlife? Why or why not?
15. Has a zoo ever affected what you understand about conserving/protecting wildlife? If yes, please explain.
16. Has a zoo ever affected how you feel about conserving/protecting wildlife? If yes, please explain.
18. What type(s) of learning activities would you most like to do during the class trip to the zoo this year? Why? How will they help you to learn?
19. What type of learning activities would you least like to do during the class trip to the zoo this year? Why?
20. What do you hope to learn/interests you the most in this unit of study on Conserving Biodiversity?
21. Is there anything else that you think I should know about your experiences related to what we've talked about in this interview?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Interview Protocol: Student/After Unit of Study

Demographic/Background Questions (only for those who did not do the pre-interview):
1. What is your age and date of birth?
2. Male/Female?
3. Have you taken the Grade 11 Biology course before?
4. How many times have you been to the Toronto Zoo (not including our trip)? How many were school trips?
5. Have you been to any other zoo(s)? Which one(s)? Approx. how many times? Were any of these school trips?
6. Do you belong to any groups/organizations which support/focus on nature/wildlife/conservation/ the environment?

Focal Questions Part 1: School Focus
7. On a scale of 1-5, 5 being most knowledgeable and 1 being least knowledgeable, how knowledgeable do you think you are when it comes to conserving/protecting biodiversity/wildlife? Why do you think this?
8. How, if at all, did the Biodiversity unit affect what you know or understand about conservation? Can you give an example?
10. How, if at all, did the Biodiversity unit affect how you feel/care about or what you believe about conservation? Can you give an example?
11. What (if anything) do you do to conserve/protect biodiversity/wildlife at home/school/etc.? Can you give any specific examples?
12. How, if at all, did Biodiversity unit affect what you do about conservation? Can you give an example?
13. Do you think conserving wildlife biodiversity is important to humans in general? Why or why not?
14. Do you think conserving wildlife biodiversity is straightforward from person to person, culture to culture? Explain.
15. What did you think about Mr. ----------’s “Zoos and Misperceptions” presentation? What did you learn from it?
16. What did you think about the Dilemma card assignment? What did you learn from it?
17. What did you think about the Zoo Diaries video? What did you learn from it?
18. Why did you choose your topic for the major project?
19. (a) What did you think about the major project?
   (b) What about the action component specifically (i.e., taking it to the next level?)
   (c) What did you learn from it? How did you feel after doing it?
20. (a) What action goal(s) did your group achieve?
   (b) What action goal(s) had you hoped to achieve but did not?
   (c) Why do you think these goal(s) were not attained?
21. If you were to do this action project again, what would you do differently?
22. Would you like to continue to do action projects in science? Why or why not?
23. Do you think you will continue to take action on conservation issues on your own time?

24. (a) What did you enjoy most in the Biodiversity unit of study? Why?
   (b) What did you enjoy least in the Biodiversity unit of study? Why?
   (c) What would you say was the most important/memorable thing(s) you learned about conserving biodiversity/wildlife in this unit of study?
   (d) If you were to do this unit of study again at school, what type(s) of learning activities would you most like to do? Why? What would you learn from it?

Focal Questions Part 2: Zoo Focus

25. (a) How do you feel about zoos in general? Why?
   (b) Has this changed since before our unit of study and the zoo trip?
   (c) Do you feel that both the positive and negative sides of zoos were discussed in our unit of study at school?
   (d) For those who do not like zoos.....how have your negative feelings toward zoos impacted your learning in this unit, either at school or during the zoo visit?

26. (a) What do you know about what zoos do/their missions?
   (b) What do you know about zoos' conservation efforts?
   (c) How did you come to know this?
   (d) Do you think zoos do a good job at achieving these missions? Why/why not?
   (e) Do you think zoos do enough to conserve wildlife? Why or why not?

27. What did you think about the Zoos and Conservation presentation? What did you learn from it?

28. What did you think about the Behind-the-Scenes tour – specifically the rhino visit? What did you learn from it?

29. What did you think about the Behind-the-Scenes tour – specifically the animal nutrition centre visit? What did you learn from it?

30. What did you think about the rest of the guided tour (e.g., through the African and Americas pavilion)? What did you learn from it?

31. What did you think about having free time to explore the zoo? What did you learn from it?

32. Did any part of our zoo visit affect what you understand about conserving/protecting wildlife? If yes, please explain.

33. Did any part of our zoo visit affect how you feel about conserving/protecting wildlife? If yes, please explain.

34. Did any part of our zoo visit affect what you do about conserving/protecting wildlife (e.g., at home, at school, etc.)? If yes, please explain.

35. (a) What did you enjoy most about our trip to the zoo? Why?
   (b) What did you enjoy least about our trip to the zoo? Why?
   (c) What would you say was the most important/memorable thing(s) that you learned during our trip to the zoo?
   (d) If you went on a school trip to the zoo again what type(s) of learning activities would you most like to do? Why? What would you learn from it?
Focal Questions Part 3: Open-Ended Closing Questions

36. Is there anything else related to zoos and conservation that you would like to learn about, that was not covered in this unit of study or on during our visit to the zoo?

37. Is there anything else that you think I should know about your experiences with the conserving biodiversity unit of study and/or during the zoo trip?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Interview Protocol: Zoo Volunteer/Workshop Leader

Notes:
Questions in plain font are geared to all.

**Questions in bold font are geared to those who work with school groups.**
*Questions in italic font are geared to those who work with the general public.*

Demographic/Background Questions:
1. a. What is your current position at the Toronto Zoo?
   b. Briefly, what does this position entail?
   c. What training/certification/education/experience does this position require?
   d. Is education part of your mandate? If so, do you work toward educating school groups, the general public, or some other group?
2. How many years have you held this position?
3. Have you held other positions at the Toronto Zoo? If so, what were they and for how long?
4. Have you worked at other zoos? In what capacity? For how long?

Focal Questions:
5. What would you say are the main conservation education goals of the Toronto Zoo?
6. a. Does your department at the Toronto Zoo have its own mission statement?
   b. What is it?
   c. Is there a conservation education focus?
   d. If no, do you think there should be a conservation education focus?
7. a. What educational programs/resources/efforts offered by the Toronto Zoo are you directly involved with? In what capacity?
   b. Which of these have a conservation education focus?
   c. Which of these are also tied to school science curriculum?
8. In your opinion, how successful are each of these programs/resources/efforts in promoting zoo visitors’:
   a. conservation-related knowledge/understanding? Can you give any specific examples?
   b. conservation-related attitudes? Can you give any specific examples?
   c. conservation-related actions/behaviour? Can you give any specific examples?
9. In your opinion, how successful are each of these programs/resources/efforts in promoting students’:
   a. conservation-related knowledge/understanding? Can you give any specific examples?
   b. conservation-related attitudes? Can you give any specific examples?
   c. conservation-related actions/behaviour? Can you give any specific examples?
10. In your opinion, how successful are each of these programs/resources/efforts in promoting teachers'/adult supervisors' (i.e., what is the impact of these efforts):
   a. conservation-related knowledge/understanding? Can you give any specific examples?
   b. conservation-related attitudes? Can you give any specific examples?
   c. conservation-related actions/behaviour? Can you give any specific examples?

11. What do you hope students and/or teachers take away with them at the end of their zoo trip?

12. What do you hope zoo visitors take away with them at the end of their zoo trip?

13. Is there anything else that you think could be done to enhance the promotion of conservation education for school groups visiting the Toronto Zoo:
   a. by the Toronto Zoo?
   b. by the teachers?
   c. by the students?

14. Is there anything else that you think could be done to enhance the promotion of conservation education for Toronto Zoo visitors?

15. Is there anything else that you think I should know about conservation education at the Toronto Zoo?

Additional Questions for the Volunteer who led the Research Group’s Tour ONLY:

16. a. What conservation-related knowledge/understanding did you hope our class walked away with after your guided/behind-the-scenes tour (i.e., white rhino exhibit and Animal Nutrition Center)?
   b. How, if at all, did you try to promote this learning goal?

17. a. What conservation-related attitudes did you hope our class walked away with after your guided/behind-the-scenes tour?
   b. How, if at all, did you try to promote this learning goal?

18. a. What conservation-related actions/behaviours did you hope to promote for our class during your guided/behind-the-scenes tour?
   b. How, if at all, did you try to promote this learning goal?

19. How successful do you believe you were in meeting these goals? Please explain.

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Interview Protocol: Zoo Manager/Coordinator/Curator

Notes: Questions in plain font are geared to all.

**Questions in bold font are geared to those who work with school groups.**

Questions in italic font are geared to those who work with the general public.

**Questions in bold italic font are geared to the curator (note: some italic and bold font questions are also relevant to the curator).**

Demographic/Background Questions:
1. a. What is your current position at the Toronto Zoo?
   b. Briefly, what does this position entail?
   c. What training/certification/education/experience does this position require?
   d. Is education part of your mandate? If so, do you work toward educating school groups, the general public, or some other group?
2. How many years have you held this position?
3. Have you held other positions at the Toronto Zoo? If so, what were they and for how long?
4. Have you worked at other zoos? In what capacity? For how long?

Focal Questions:
5. Can you speak to the recent shift toward education and conservation education at the Toronto Zoo and zoos in general?
6. What would you say are the main conservation education goals of the Toronto Zoo?
7. a. Does your department at the Toronto Zoo have its own mission statement?
   b. What is it?
   c. Is there a conservation education focus?
   d. If no, do you think there should be a conservation education focus?
8. a. What programs/resources offered by the Toronto Zoo focus on conservation education specifically?
   b. Who typically runs these educational programs?
   c. Which of these, if any, are tied to school science curriculum?
9. How, if at all, do outreach programs for school groups promote conservation education for:
   a. students?
   b. teachers?
10. **How, if at all, are the exhibits chosen/Designed to promote conservation education goals among visitors? Can you give any specific examples?**
11. a. What educational programs/resources/efforts offered by the Toronto Zoo are you directly involved with? In what capacity?
    b. Which of these have a conservation education focus?
    c. Which of these are also tied to school science curriculum?
12. In your opinion, how successful are each of these programs/resources/efforts in promoting zoo visitors’:
   a. conservation-related knowledge/understanding? Can you give any specific examples?
   b. conservation-related attitudes? Can you give any specific examples?
   c. conservation-related actions/behaviour? Can you give any specific examples?

13. In your opinion, how successful are each of these programs/resources/efforts in promoting students’:
   a. conservation-related knowledge/understanding? Can you give any specific examples?
   b. conservation-related attitudes? Can you give any specific examples?
   c. conservation-related actions/behaviour? Can you give any specific examples?

14. In your opinion, how successful are each of these programs/resources/efforts in promoting teachers/adult supervisors’:
   a. conservation-related knowledge/understanding? Can you give any specific examples?
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15. What do you hope students and/or teachers take away with them at the end of their zoo trip?

16. What do you hope zoo visitors take away with them at the end of their zoo trip?

17. Is there anything else that you think could be done to enhance the promotion of conservation education for school groups visiting the Toronto Zoo:
   a. by the Toronto Zoo?
   b. by the teachers?
   c. by the students?

18. Is there anything else that you think could be done to enhance the promotion of conservation education for Toronto Zoo visitors?

19. Is there anything else that you think I should know about conservation education at the Toronto Zoo?

THANK YOU VERY MUCH FOR PARTICIPATING IN THIS INTERVIEW.
Appendix F: Student and Teacher Surveys

Saint Louis Zoo Conservation Survey Instrument (Jordan & Seger, 2001)
(Student/Before Unit of Study Version- Adapted by J. Skinner-Winslow)

Dear Students:

Thank you for filling out this questionnaire. This is the first of two questionnaires. By completing these, you will have a chance to reflect on your personal conservation-related knowledge, attitudes and actions before and after our unit of study on Zoos and Conserving Biodiversity.

Please be completely honest when you record your responses. The questions do not have a right or wrong answer. If you require more space for your answers please use the back of the survey. Your answers to these questions will be kept confidential and for those participating in the research study, they will only be used to help better understand your experiences during this unit of study and how to make it better.

Name __________________________________________  Date  _____________________

Please note that the term wildlife is used to refer to any animal that is living in a free condition and not tamed or domesticated (pet, farm animal). A wild animal provides for its own food, shelter and other needs in its habitat. Zoo animals are not to be considered wildlife.

<table>
<thead>
<tr>
<th>How much do you know about...</th>
<th>Nothing at all</th>
<th>A little</th>
<th>Quite a bit</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Things you can do to protect the environment</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2. Things you can do to protect local wildlife.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>3. Things you can do to protect wildlife in other countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much do you care about...</th>
<th>Not at all</th>
<th>A little</th>
<th>Quite a bit</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Local wildlife such as beetles, frogs, geese, and deer.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>5. Local wildlife habitat like fields, forests, rivers, wetlands.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>6. Wildlife from other countries such as leopards, gazelle, penguins and elephants.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>7. Wildlife habitat in other countries such as tropical forests, tundra, reefs and swamps.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>8. Protecting the natural environment.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>9. Protecting local wildlife.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>10. Protecting wildlife from other countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
How often have you done these things in the past month?

11. Recycled paper, glass, plastic, metals or food wastes (composted) to create less waste. 0 1 2 3 4+
12. Picked up litter/trash cleanup. 0 1 2 3 4+
13. Helped improve wildlife habitat by providing food, water, shelter or cover for animals living in your backyard, school or park. 0 1 2 3 4+
14. Didn't buy products with excess packaging to help the environment. 0 1 2 3 4+
15. Purchased items that do not harm wildlife or ones that help wildlife. 0 1 2 3 4+
16. Raised and/or donated money to help solve an environmental problem. 0 1 2 3 4+
17. Encouraged others to protect the environment. 0 1 2 3 4+
18. Encouraged others to help wildlife or to stop doing an activity which is harmful to animals. 0 1 2 3 4+
19. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to the environment or do something to help the environment. 0 1 2 3 4+
20. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to wild animals or to do something to help wild animals. 0 1 2 3 4+
21. Please describe any other action(s) that you did to help wildlife or the environment.
________________________________________________________________________________
________________________________________________________________________________

How much do you agree with the following statements?  Not at all  A little  Quite a bit  Very much

<table>
<thead>
<tr>
<th>Statement</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. I feel personally responsible (by myself or with others) to help solve environmental problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I feel personally responsible (by myself or with others) to help wildlife found in nearby areas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. I feel personally responsible (by myself or with others) to help wildlife found in far away countries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. By working on my own or with others, I can help solve environmental problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. By working on my own or with others, I can help wildlife found around me or in nearby areas.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. By working on my own or with others, I can help wildlife found in far away areas/countries.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
28. Are you a member of any environmental group(s)? ____________
Which ones? ____________________________________________________________

29. Check the experiences you participate in (outside of school):
___ camping ___ hiking ___ boating ___ nature study ___ fishing ___ hunting
___ visiting zoos ___ visiting museums ___ visiting science centres ___ visiting conservation areas / provincial or national parks

30. List as many ways as you know that zoos help conserve wildlife and wild places. _______________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
Dear Students:

Thank you for filling out this questionnaire. This is the second of two questionnaires. By completing these, you will have a chance to reflect on your personal conservation-related knowledge, attitudes and actions before and after our unit of study on Zoos and Conserving Biodiversity.

Please be completely honest when you record your responses. The questions do not have a right or wrong answer. If you require more space for your answers please use the back of the survey. Your answers to these questions will be kept confidential and for those participating in the research study, they will only be used to help better understand your experiences during this unit of study and how to make it better.

Name ________________________________ Date ___________________

Please note that the term wildlife is used to refer to any animal that is living in a free condition and not tamed or domesticated (pet, farm animal). A wild animal provides for its own food, shelter and other needs in its habitat. Zoo animals are not to be considered wildlife.

How much do you know about...

<table>
<thead>
<tr>
<th>Things you can do to protect the environment</th>
<th>A</th>
<th>B</th>
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<th>D</th>
</tr>
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<tbody>
<tr>
<td>1. Things you can do to protect the environment</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2. Things you can do to protect local wildlife.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>3. Things you can do to protect wildlife in other countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

How much do you care about...

<table>
<thead>
<tr>
<th>Local wildlife such as beetles, frogs, geese, and deer.</th>
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<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Local wildlife such as beetles, frogs, geese, and deer.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Local wildlife habitat like fields, forests, rivers, wetlands.</td>
<td>A</td>
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<td>C</td>
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<tr>
<td>5. Local wildlife habitat like fields, forests, rivers, wetlands.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Wildlife from other countries such as leopards, gazelle, penguins and elephants.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>6. Wildlife from other countries such as leopards, gazelle, penguins and elephants.</td>
<td>A</td>
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<td>C</td>
<td>D</td>
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<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Protecting the natural environment.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
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<td>C</td>
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How often have you done these things in the past month?

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   0  1  2  3  4+

12. Picked up litter/trash cleanup.  
   0  1  2  3  4+

13. Helped improve wildlife habitat by providing food, water, shelter or cover for animals living in your backyard, school or park.  
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14. Didn't buy products with excess packaging to help the environment.  
   0  1  2  3  4+

15. Purchased items that do not harm wildlife or ones that help wildlife.  
   0  1  2  3  4+

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   0  1  2  3  4+

17. Encouraged others to protect the environment.  
   0  1  2  3  4+

18. Encouraged others to help wildlife or to stop doing an activity which is harmful to animals.  
   0  1  2  3  4+

19. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to the environment or do something to help the environment.  
   0  1  2  3  4+

20. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to wild animals or to do something to help wild animals.  
   0  1  2  3  4+

21. Please describe any other action(s) that you did to help wildlife or the environment.

________________________________________________________________________________
________________________________________________________________________________

How much do you agree with the following statements?

<table>
<thead>
<tr>
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30. List as many ways as you know that zoos help conserve wildlife and wild places. _______________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

31. a) Since you completed this survey the first time, do you think that you have changed in what you know, feel, and/or do about conservation of wildlife and wild places? If yes, please explain in detail.
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

b) If you answered yes, what experience(s) helped you to change in these ways?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
Dear Teacher:

Thank you for filling out this questionnaire. This is the first of two questionnaires. By completing these, you will have a chance to reflect on your personal conservation-related knowledge, attitudes and actions before and after our unit of study on Zoos and Conserving Biodiversity.

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Name __________________________________________  Date  _____________________

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<td>B</td>
<td>C</td>
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</tr>
<tr>
<td>2. Things you can do to protect local wildlife.</td>
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<td>D</td>
</tr>
<tr>
<td>8. Protecting the natural environment.</td>
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<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>9. Protecting local wildlife.</td>
<td>A</td>
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<td>C</td>
<td>D</td>
</tr>
<tr>
<td>10. Protecting wildlife from other countries.</td>
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<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
**How often have you done these things in the past month?**

11. Recycled paper, glass, plastic, metals or food wastes (composted) to create less waste. 0 1 2 3 4+

12. Picked up litter/trash cleanup. 0 1 2 3 4+

13. Helped improve wildlife habitat by providing food, water, shelter or cover for animals living in your backyard, school or park. 0 1 2 3 4+

14. Didn't buy products with excess packaging to help the environment. 0 1 2 3 4+

15. Purchased items that do not harm wildlife or ones that help wildlife. 0 1 2 3 4+

16. Raised and/or donated money to help solve an environmental problem. 0 1 2 3 4+

17. Encouraged others to protect the environment. 0 1 2 3 4+

18. Encouraged others to help wildlife or to stop doing an activity which is harmful to animals. 0 1 2 3 4+

19. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to the environment or do something to help the environment. 0 1 2 3 4+

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21. Please describe any other action(s) that you did to help wildlife or the environment.

________________________________________________________________________________

________________________________________________________________________________

**How much do you agree with the following statements?**

<table>
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</tr>
<tr>
<td>24. I feel personally responsible (by myself or with others) to help wildlife found in far away countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>25. By working on my own or with others, I can help solve environmental problems.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>26. By working on my own or with others, I can help wildlife found around me or in nearby areas.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>27. By working on my own or with others, I can help wildlife found in far away areas/countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
28. Are you a member of any environmental group(s)? ____________
   Which ones? ___________________________________________________________________________________

29. Check the experiences you participate in (outside of school):
   ___ camping ___ hiking ___ boating ___ nature study ___ fishing ___ hunting
   ___ visiting zoos ___ visiting museums ___ visiting science centres ___ visiting conservation areas / provincial or national parks

30. List as many ways as you know that zoos help conserve wildlife and wild places. _______________
   __________________________________________________________________________________
   __________________________________________________________________________________
   __________________________________________________________________________________
   __________________________________________________________________________________
Saint Louis Zoo Conservation Survey Instrument (Jordan & Seger, 2001)
(Teacher/After Unit of Study Version- Adapted by J. Skinner-Winslow)

Dear Teacher:

Thank you for filling out this questionnaire. This is the second of two questionnaires. By completing these, you will have a chance to reflect on your personal conservation-related knowledge, attitudes and actions before and after our unit of study on Zoos and Conserving Biodiversity.

Please be completely honest when you record your responses. The questions do not have a right or wrong answer. If you require more space for your answers please use the back of the survey. Your answers to these questions will be kept confidential and for those participating in the research study, they will only be used to help better understand your experiences during this unit of study and how to make it better.

Name __________________________________________  Date  _____________________

Please note that the term wildlife is used to refer to any animal that is living in a free condition and not tamed or domesticated (pet, farm animal). A wild animal provides for its own food, shelter and other needs in its habitat. Zoo animals are not to be considered wildlife.

<table>
<thead>
<tr>
<th>How much do you know about...</th>
<th>Nothing at all</th>
<th>A little</th>
<th>Quite a bit</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Things you can do to protect the environment</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>2. Things you can do to protect local wildlife.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>3. Things you can do to protect wildlife in other countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much do you care about...</th>
<th>Not at all</th>
<th>A little</th>
<th>Quite a bit</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Local wildlife such as beetles, frogs, geese, and deer.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>5. Local wildlife habitat like fields, forests, rivers, wetlands.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>6. Wildlife from other countries such as leopards, gazelle, penguins and elephants.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>7. Wildlife habitat in other countries such as tropical forests, tundra, reefs and swamps.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>8. Protecting the natural environment.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>9. Protecting local wildlife.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>10. Protecting wildlife from other countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
### How often have you done these things in the past month?

11. Recycled paper, glass, plastic, metals or food wastes (composted) to create less waste.  
   0  1  2  3  4+

12. Picked up litter/trash cleanup.  
   0  1  2  3  4+

13. Helped improve wildlife habitat by providing food, water, shelter or cover for animals living in your backyard, school or park.  
   0  1  2  3  4+

14. Didn't buy products with excess packaging to help the environment.  
   0  1  2  3  4+

15. Purchased items that do not harm wildlife or ones that help wildlife.  
   0  1  2  3  4+

16. Raised and/or donated money to help solve an environmental problem.  
   0  1  2  3  4+

17. Encouraged others to protect the environment.  
   0  1  2  3  4+

18. Encouraged others to help wildlife or to stop doing an activity which is harmful to animals.  
   0  1  2  3  4+

19. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to the environment or do something to help the environment.  
   0  1  2  3  4+

20. Wrote a letter to a person, newspaper or company asking them to stop an activity harmful to wild animals or to do something to help wild animals.  
   0  1  2  3  4+

21. Please describe any other action(s) that you did to help wildlife or the environment.

________________________________________________________________________________
________________________________________________________________________________

### How much do you agree with the following statements?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>A little</th>
<th>Quite a bit</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. I feel personally responsible (by myself or with others) to help solve environmental problems.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>23. I feel personally responsible (by myself or with others) to help wildlife found in nearby areas.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>24. I feel personally responsible (by myself or with others) to help wildlife found in far away countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>25. By working on my own or with others, I can help solve environmental problems.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>26. By working on my own or with others, I can help wildlife found around me or in nearby areas.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>27. By working on my own or with others, I can help wildlife found in far away areas/countries.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>
28. Are you a member of any environmental group(s)? ____________
   Which ones? __________________________________________________________________________________________

29. Check the experiences you participate in (outside of school):
   ___ camping ___ hiking ___ boating ___ nature study ___ fishing ___ hunting
   ___ visiting zoos ___ visiting museums ___ visiting science centres ___ visiting conservation areas / provincial or national parks

30. List as many ways as you know that zoos help conserve wildlife and wild places. _______________
    __________________________________________________________________________________
    __________________________________________________________________________________
    __________________________________________________________________________________
    __________________________________________________________________________________

31. a) Since you completed this survey the first time, do you think that you have changed in what you know, feel, and/or do about conservation of wildlife and wild places? If yes, please explain in detail.
    __________________________________________________________________________________
    __________________________________________________________________________________
    __________________________________________________________________________________
    __________________________________________________________________________________

   b) If you answered yes, what experience(s) helped you to change in these ways?
    __________________________________________________________________________________
    __________________________________________________________________________________
    __________________________________________________________________________________
Appendix G: Qualitative Data Analysis Tables
Table G1

Sample Unitizing of Raw Data

<table>
<thead>
<tr>
<th>Participant</th>
<th>Transcript (including initial data units and codes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logan:</td>
<td>But definitely Bobby and Liam’s project, I thought that was pretty good. A good turning point for them.</td>
</tr>
<tr>
<td>Jennifer:</td>
<td>Yeah. It’s interesting that two groups focused on gorillas and they had two totally different presentations.</td>
</tr>
<tr>
<td>Logan:</td>
<td>Yeah. In fact actually until you mentioned that I forgot that.</td>
</tr>
<tr>
<td>Jennifer:</td>
<td>And I thought that was interesting too, that you brought up with Jacob that he might want to focus on World Wildlife Fund instead of the zoo. [Teacher responds to student’s views against zoos]</td>
</tr>
<tr>
<td>Logan:</td>
<td>Well the interesting thing is in the presentation you can tell there are two different opinions - two different opinions come through in the presentation. I was actually surprised that they had anything to do with the Toronto Zoo in there. [Students with different opinions work together/Teacher reflection on student compromise]</td>
</tr>
<tr>
<td>Jennifer:</td>
<td>Yeah. I was planning to try to bring that up in the interview so well, to see how he felt about that. I don’t know if maybe he didn’t feel there was a way around it. Like maybe he felt he needed to cover the zoo.</td>
</tr>
<tr>
<td>Logan:</td>
<td>Yeah. I did tell him beforehand not to include zoos, but the other members in the group they liked the zoo and they felt that zoos are worthwhile. [Teacher responds to conflicting student views] [Student view for zoos] So, that might have been the compromise too as well. [Student response to conflicting views/Students compromise] Because even before when we talked about zoos, the other boys said we will put this in our project and then he’ll go with it, and Jacob said no actually, I won’t. That’s when he wrote the comment, I hate zoos. It’s because actually in regards to what they had said. [Student response to conflicting views/Student view against zoos]</td>
</tr>
<tr>
<td>Jennifer:</td>
<td>Was he retaliating…..</td>
</tr>
<tr>
<td>Logan:</td>
<td>I think it was a strong statement, he was trying to make a point. [Student response to conflicting views]</td>
</tr>
<tr>
<td>Jennifer:</td>
<td>Well I thought that was good that you brought up the idea that if they didn’t want to do a fundraising project or something [for zoos], a</td>
</tr>
</tbody>
</table>
conservation organization that protect nature and wildlife would be good too. [Teacher responds to conflicting student views]

Logan: It’s spring boarding – that’s the whole idea. Basically, at the end that might be the justification for zoos. A spring board. To see the animal there and say you know what, this is the animal, and start looking at wildlife. It’s a good reason to have zoos for that reason alone. [Teacher view for zoos/Zoo as a spring board/Justification for zoos]

Jennifer: Yes, well it will be interesting to see how their projects develop.

Logan: Yes. So that all sounds good. We will start hitting that other stuff off.

Note. This is an excerpt from a larger file entitled “Teacher-Researcher Meeting Transcript”.
Table G2

Sample Tentative Coding Categories

<table>
<thead>
<tr>
<th>Category Name</th>
<th>Units Of Data/Subcategories/Researcher Insights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Views</td>
<td></td>
</tr>
</tbody>
</table>
| For Zoos           | - **general positive descriptors (student)**  
                       - zoos are **good** (Jackie, Interview Transcript#1, p.3; Calvin, Interview Transcript#1, p.3; Charlie, Interview Transcript#2, p. 5)  
                       - students **like** zoos / zoos are **worthwhile** (observed by Teacher about students, Meeting Transcript, p.10)  
                       - **likes** zoos (Charlie, Interview Transcript#1, p.3)  
                       - “we really focused on the Toronto Zoo and that was a **fantastic** zoo” (Jackie, Interview Transcript#2, p.4)  
                       - “I **didn’t really have negative feelings** about zoos.” (Calvin, Interview Transcript#2, p.3)  
                       - note: this contradicts his mixed response below  
                       “I had a positive outlook before, but now I have a more positive outlook because before I didn’t like know about the behind-the-scenes stuff and now I do, so it is just better.” (Charlie, Interview Transcript#2, p.5)  
                       - note: this also codes under students’ changing views  
                       - **zoos provide people with enjoyment (student)**  
                       - likes going to the zoo and seeing the animals (IT#1/S#2-2), (IT#1/S#3-3), (IT#1/S#4-3), (IT#1/S#5-2), (IT#1/S#6-2)  
                       - note: there are more examples to be found in student interview transcripts  
                       - “Anything about the zoo is good. I like to see all the animals.” (Calvin, Interview Transcript#1, p.5)  
                       - **zoos help/protect animals (student)**  
                       - “They’re actually keeping them from like being killed by other animals in like the wild, and like things like that.” (Jackie, Interview Transcript#1, p.3)  
                       - stop animals from becoming extinct (Jackie, Interview Transcript#1, p.4)  
                       - “I like how they help all the animals and stuff so I think it’s a good thing.” (Bobby, Interview Transcript#2, p.4-6)  
                       - positive views on zoos and their conservation efforts and their care of zoo animals (IT#1/S#5-4)  
                       - “save and protect animals” (Calvin, Interview Transcript#1, p.4)  |
zoos take good care of the animals (student)
-“I think they do because the amount of animals you see at the zoo. And then how they’re so well taken care of” (Jackie, Interview Transcript#1, p.4)
-remembers the importance placed on taking care of animals at the zoo/ believes that the Toronto zoo does a good job of taking care of zoo animals (Bobby, Interview Transcript#1, p.4-5)
-“they are treating them well” (Calvin, Interview Transcript#1, p.3)
-“Because you go to zoos and see so many animals that they work with and they seem to be doing a good job. If they weren’t, they would be dying and wouldn’t be too good.” (Calvin, Interview Transcript#1, p.4)
-“I am not sure about that, but I mean if it comes about that something that’s happened out in the wild, I guess they could take them in. Especially if they are doing research on them and they have a little tag put on them and like dolphins or something and study their way of life I guess. That can also help in the way they treat animals in the zoo.” (Calvin, Interview Transcript#1, p.5)
-“And it’s not like it’s like the circus, how they’re hurting the animals.” (Jackie, Interview Transcript#1, p.3) –note: it’s not like a circus/continuum on using animals for entertainment, with zoos being superior to circuses in their treatment of animals was stated by teacher in class.

zoos as spring board for learning (students) -note: this phrase coined by teacher
-“They are a good way to show like younger kids and like, everyone, how important animals are...Because like they help the community realize, like how to become knowledgeable on the subject of animals becoming extinct” (Jackie, Interview Transcript#1, p.4)
-“They’re a...it’s a good way to show like younger kids and like everyone, how important animals are.” (Jackie, Interview Transcript#1, p.3)
-“Zoos are good because they’re doing a lot to inform people about conserving biodiversity of wildlife” (Tessa, Interview Transcript#2, p.4)
-“How to cope with animals we live with and do something good for them to keep them alive.” (Calvin, Interview Transcript#1, p.3)
thinks that people can learn from them and that this learning justifies keeping animals captive in zoos (Charlie, Interview Transcript #1, p.3)

Note. This is an excerpt from a larger file entitled “Tentative Coding Categories for RQ1”.
Table G3

**Final Coding Categories**

### Final coding categories for RQ1: Participant perspectives on zoos

<table>
<thead>
<tr>
<th>Student and Teacher Perspectives (Mixed and Against Zoos)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Views in support of zoos (benefits)</strong></td>
<td><strong>Views against zoos (concerns/objections)</strong></td>
</tr>
<tr>
<td>• provide enjoyment for people, however…</td>
<td>• …captivity of wild animals</td>
</tr>
<tr>
<td>• educate and inspire people, however…</td>
<td>• …questionable standards of care</td>
</tr>
<tr>
<td>• help and protect animals, however…</td>
<td>• …using animals for entertainment</td>
</tr>
</tbody>
</table>

**Evolving Student Perspectives**

<table>
<thead>
<tr>
<th>Shifting emphases for and against zoos</th>
<th>Shifting concepts of zoos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• heterogeneous community</td>
</tr>
<tr>
<td></td>
<td>• conservation centres</td>
</tr>
</tbody>
</table>

**Zoo Staff Perspectives (For Zoos)**

<table>
<thead>
<tr>
<th>Views in support of zoos (benefits)</th>
<th>Concerns about public perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>• provide enjoyment for people</td>
<td></td>
</tr>
<tr>
<td>• educate and inspire people</td>
<td></td>
</tr>
<tr>
<td>• contribute to research and conservation</td>
<td></td>
</tr>
</tbody>
</table>

### Final coding categories for RQ2: Participant responses to multiple perspectives

<table>
<thead>
<tr>
<th>Teacher Responses (Pedagogy and Positioning)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate about zoos</td>
<td></td>
</tr>
<tr>
<td>Expose students to alternative conceptions of zoos</td>
<td></td>
</tr>
<tr>
<td>Model and encourage the sharing of multiple views</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zoo Staff Responses (Pedagogy and Positioning)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate about zoos</td>
<td></td>
</tr>
<tr>
<td>Create a sharing session</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Responses (Teaching and Learning Reflections/Interactions)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance and impact of pedagogy</td>
<td></td>
</tr>
<tr>
<td>Respect and tension in student interactions</td>
<td></td>
</tr>
<tr>
<td>Impact of views against zoos on learning</td>
<td></td>
</tr>
</tbody>
</table>
Appendix H: Figures
**Multiple Views on Zoos:**
• centres on the complex relationship between zoo animals and people, justification for the existence of zoos, and/or the rights and welfare of zoo animals
• stems from philosophical, moral, and/or ethical positions

**For-Zoos Stance:**
• proponents hold views in support of zoos
  • zoos offer firsthand experiences with wildlife
  • zoos perform critical and necessary roles in society
  For example:
  • for many people zoos are the only option for firsthand exposure to wildlife (e.g., safaris are expensive)
  • firsthand connections are more meaningful than exposure through media such as books, television, or the Internet

**Mixed Views Stance:**
• proponents concurrently hold views for and against zoos
  • the benefits of zoos outweigh the negatives
  For example:
  • zoos contribute to recreation, research, education, and conservation
  • threats to wildlife in the wild

**Against-Zoos Stance:**
• proponents hold views against zoos
  • the rights and/or welfare of animals are compromised in zoos
  OR
  • proponents hold views in support of zoos but only under certain conditions/qualified by certain stipulations
  For example:
  • animal health, longevity, and/or reproduction can be compromised in zoos
  • zoos impose limitations on animals’ natural behaviours, freedom, and/or dignity through confinement in captivity

**For example:**
• zoos contribute to recreation, research, education, and conservation
• threats to wildlife in the wild

**For example:**
• zoos protect threatened and endangered wildlife that might otherwise not survive due to increasing threats in the wild

**For example:**
• the rights and/or welfare of animals are compromised in zoos

**For example:**
• critiquing the benefits of zoos proposed by those holding a “for-zoos” stance

**For example:**
• alternative exposure to wildlife (e.g., in natural spaces or through media such as books, television, or the Internet) is preferable to zoos

**Figure H1.** Overview of the multiple views on zoos found in the literature reviewed in Chapter 2.
Figure H2. Rabb’s (1994, p. 162) evolution of zoos; from menagerie to zoological park to conservation centre.